ELECTRICAL WEST

A McGRAW-HILL PUBLICATION

February 1959

50 Cents

Another Order on the Way!

RT&E's Portland plant employees watch with pride as a shipment of distribution transformers is delivered to an important west coast customer.

This is typical of the fast service that is now available to all west coast transformer users from this new manufacturing plant.

Your representatives are cordially invited to visit us here in Portland and inspect the facilities that are at your service.

RT&E

ENGINEERING TALENT CONCENTRATED ON ONE IDEA
A BETTER TRANSFORMER

CORPORATION

WAUKESHA, WISCONSIN • PORTLAND, OREGON

* RT&E GROWS TO BETTER SERVE THE GROWING WEST

editorial views

EW

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Promotional Push

Electrical contractors in one area of California have taken the offensive to sell all-electric homes. The Santa Clara-San Benito Chapter of the National Electrical Contractors Assn. is subsidizing a tract builder to go all-electric, paying the difference between the initial cost of the all-electric installation vs its gas counterpart. Three new homes in this tract will be Gold Medallion models of modern all-electric living.

Obviously, through this action the electrical contractors are investing in jobs and sales volume for the future. More than that they are creating a broader based electrical market which other components of the electrical industry will share. Manager George Harter and his fine NECA group deserve the plaudits of the whole electrical industry for their pioneering action. Let's hope the concept is contagious.

Make it a Habit!

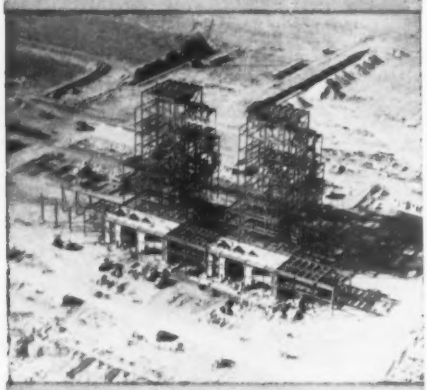
The growing dynamic electrical industry in the West deserves the best of everything—including its own business publication. With due regard for modesty, Electrical West is the only all-industry channel of communication between all segments of the electrical fraternity in the 12 Western states and Hawaii. In discharging the responsibility of reporting facts, recording events, describing new techniques, disseminating new concepts and correlating activities through the printed word, the editorial staff is deeply conscious of the obligation to provide the best possible publishing service for its 13,000 readers.

The dramatic natural color photographs of Western electrical installations, which now appear on the covers of this magazine, are a step in this direction. At the back of the book the advertisers' index has been improved by listing the local offices where additional information can be obtained quickly and easily on the products which manufacturers provide to help the industry grow and prosper. Between the covers editorial and advertising messages provide information needed each month to give a perspective of the industry as well as details of its day-to-day operations. Our objective is to make cover-to-cover reading of each issue a "must" for the thousands of electrical people who spark plug industry progress.

Magic Number

Now that the statisticians and economists have finished providing the figures for this, Electrical West's annual statistical and review number, the projected figure for Electrical West's second Kilowatt-Hour Rodeo is available. Based on 10 months of operation, the projected energy generated in the 11 Western states looks to be 122,796,000,000 kwh. While this is not a final figure, it should give heart to those among the 1,410 entries into the contest who guessed somewhere between 122 and 123 billion. It won't be until April that the official FPC figures for 1958 will be available. At that time the winner will be announced and the $500 worth of stock of California Electric Power Co. awarded.

New Hydro for PGE 74



Ocotillo Steam Plant 66

Reeves Station 74

Olympic Load Builder 73

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S. Established 1887

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CONTENTS

VOL. 122, NO. 2 FEBRUARY 1959

Spend a Billion in '59 59
Statistical Report 61
Calendar of New Generation 62
Utility Executives Report on '59 66
Case of the Invisible Building by William P. Mazzetti 84
The Gentle Art of Counseling by Dr. William H. Pemberton 87
Accelerating the Load by Tom Hughes 88

The Cover—Deep inside the Sierra Nevada Mountains is this 128,000-kw plant carved out of solid granite as part of Pacific Gas and Electric Co.'s King River hydroelectric development as it appeared in December. It is the first major underground power house in the U. S. Picture by Don Krogh of PG and E.

DEPARTMENTS

Bulletins 27
Construction News 89
Editorials 1
Electra's Husband 52
How're We Doing? 6
Letters to the Editor 50
New Products 15
News 96
News Roundup 8
Advertising Index 121, 122

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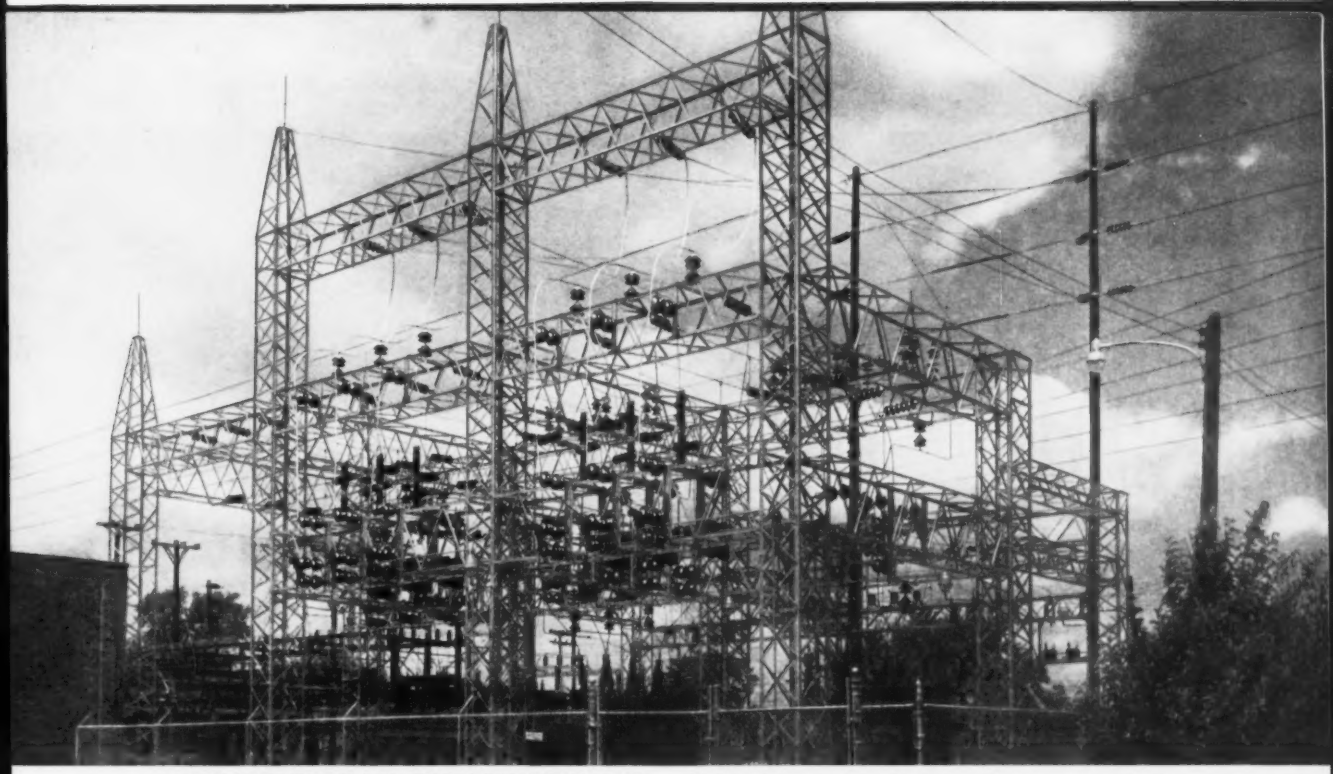

LARGE URBAN-TYPE L-M PACKAGED SUBSTATION, designed by Line Material and erected in minimum time with L-M prefabricated steel. Incoming lines are 69 kv; outgoing are 7.2/12.47 kv. L-M engineers design these packaged stations in sizes from 5 to 161 kv, for industrial plants, and for rural and urban locations on utility company lines—all with completely coordinated plans, structure, and equipment.

L-M-Engineered Packaged Substations Save Planning and Construction Time

by **W. V. SWAN**, Product Manager
Substations and Power Switching Equipment
Line Material Industries

Line Material packaged substations offer wide choice of design and application; considerable flexibility and provision for future expansion; great savings in engineering and ordering for utilities. And, because of L-M's unique prefabricated steel structure, these substations are fast and easy to erect.

One Order Does It!

Completely coordinated L-M substations need only one order; are delivered either as one shipment or coordinated to your construction schedule. It's easy to order an L-M substation. Just give us a one-line diagram of what you want—or tell us your voltage, kva requirements, number of incoming lines and outgoing feeders, and area available—and we'll design your substation for you!

Fast Erection

L-M's pre-engineered steel trusses and columns are completely prefabricated, and shipped knocked down or factory-assembled. Structures are steel, or aluminum alloy. Members have round holes punched at 3-inch intervals (before galvanizing) with square holes every foot. This eliminates measuring and drilling, and damage to galvanizing. Holes accommodate all bolts for lacing members and apparatus. That's why they go up so fast.

Prompt Shipment

Structural steel can be shipped in 3 to 4 weeks after final approval of order; complete stations in 4 to 12 weeks. Station design provides for easy, safe accessibility to all equipment. Stations meet NEMA, ASA and AIEE standards.

Ask the L-M Field Engineer for complete information and bulletins; or write Line Material Industries, Substation Department, Milwaukee 1, Wisconsin.

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382

Packaged Substations

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
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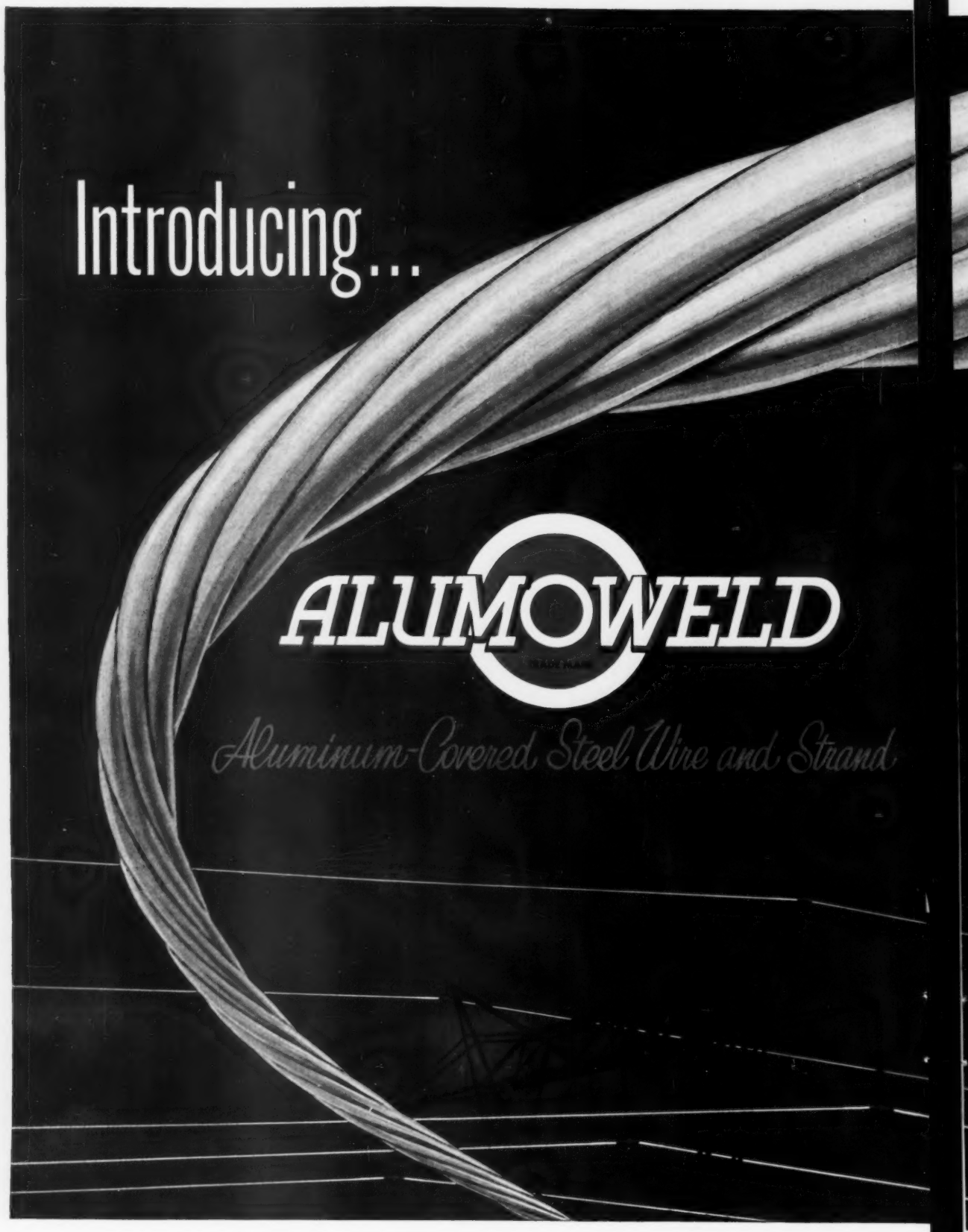
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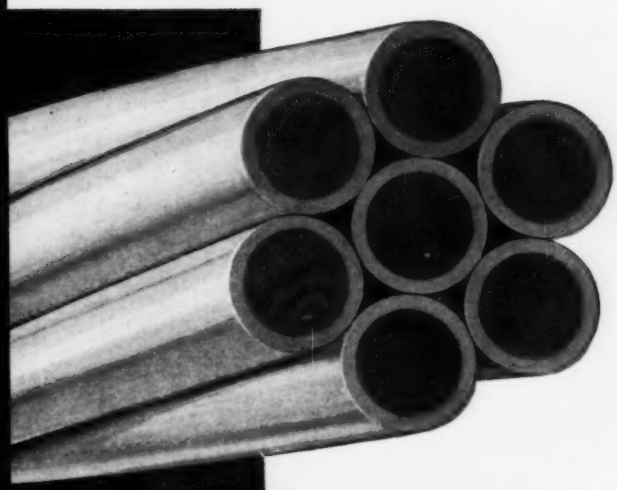
Aluminum-Covered Steel Wire and Strand



for • overhead ground wire
• guy and messenger strand
• ACSR core wire

Exclusive features—

a **thick cladding** of aluminum
a controlled **atomic weld**

Since 1915, Copperweld has pioneered the development and manufacture of bimetallic wire. Out of this accumulation of metallurgical and production experience has come Alumoweld—the only aluminum-covered steel wire with a thick layer of pure aluminum. It is also the only aluminum-covered steel wire clad by the controlled atomic weld—a completely new technique which assures a ductile and permanent weld between the two metals under all operating conditions.

The mechanical and electrical characteristics of Alumoweld make it ideal for overhead ground wire as well as for guy and messenger strand. Its thick aluminum covering—25% by area—protects the high-strength steel core against corrosion. Compared to solid aluminum wire, Alumoweld has equal life, one third the conductivity, and eight times the strength. In fact, Alumoweld has the strength of steel wire, but in addition, it has much higher conductance, and will last longer.

Another excellent application for Alumoweld is core wire for ACSR conductors. Here, Alumoweld provides the same strength as existing core wires—eliminates dissimilar metals—adds conductivity in the strength wires. And because it is corrosion-resistant, Alumoweld gives you a high-strength core wire that matches the long life of the solid aluminum wires.

For more information about Alumoweld, write us direct or contact your nearest Copperweld field representative.

When ordering ACSR from your supplier make sure of the utmost in permanency and strength by specifying Alumoweld Core Wire (ACSR/AW).

PRODUCT OF COPPERWELD STEEL COMPANY, WIRE AND CABLE DIVISION, GLASSPORT, PA.

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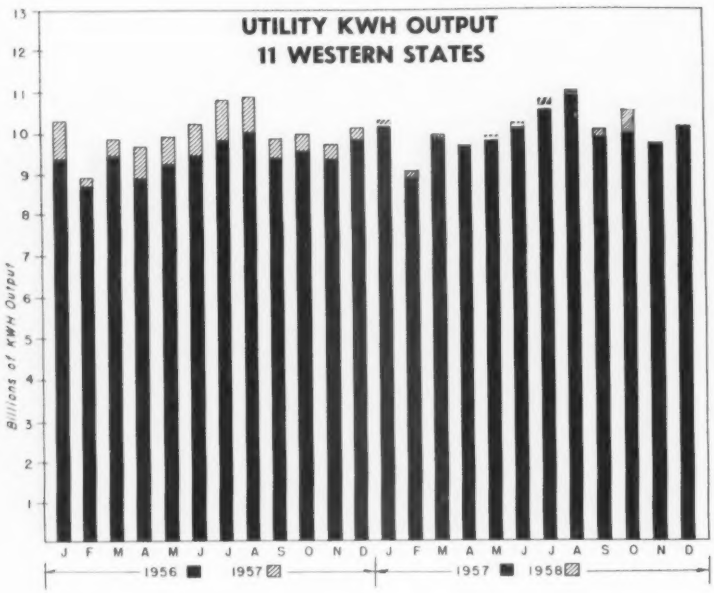
----How're We Doing?



Output Comparisons

Year-to-year Kwh Output Changes in Western Regions and U. S.
Per Cent Changes Over Same Week One Year Ago

Week Ending	Rocky Mountain	Pacific Southwest	Pacific Northwest	U. S. Total
Nov. 29	+ 5.6	+ 7.9	+ 4.5	+ 5.7
Dec. 6	+ 6.7	+ 5.2	+ 3.5	+ 5.7
Dec. 13	+ 7.6	+ 6.3	+ 7.3	+ 7.0
Dec. 20	+ 7.6	+ 7.9	+ 7.0	+ 9.0
Dec. 27	+ 7.8	+ 8.5	+ 8.3	+10.3

Market Outlook

The **electrical manufacturing industry, according to the forecast of the National Electrical Manufacturers Assn., can expect a 7% increase in goods produced in 1959 over 1958. This would bring the industry production figure to $21 billion as compared to $21.6 billion in 1957 and $19.5 billion in 1958.** The NEMA figures for 1959 indicate that the production of generation, transmission and distribution equipment will total $2,039,000,000; insulated wire and cable will account for $1,411,000,000; building supplies and equipment should total $698 million; industrial apparatus is scheduled for $2,918,000,000; illuminating equipment for $906 million; and appliances for $4,007,000,000.

U. S. Department of Commerce figures on the outlook for the electrical equipment industry set the total at $6.5 million, up 10% over 1958. The latter agency also predicts a substantial increase in distribution transformer sales with a 1959 total of approximately 15,000,000 kva in 800,000 units compared to 580,000 units in 1958.

McGraw-Hill's Engineering News-Record predicts that the heavy construction volume should top 1958 by 5% for a total of $20.2 billion. Of this total, private industrial building will acccount for $1,850,000,000; private commercial construction for $1,925,000,000 and mass housing for $3,850,000,000. **ENR's tabulated backlog of heavy construction reached a record $114 billion on Dec. 31, 1958, up $1 billion over its previous high in March of that year.**

Construction Highlights

Research Center, Saugus, Calif., $5,000,000.

Apartments: Seattle, Wash., $350,000; Portland, Ore., $3,833,440; Sacramento, Calif., $9,000,000.

Hospitals: Honolulu, $484,000; Anchorage, Alaska, $6,500,000; Salida, Colo., $800,000; Tacoma, Wash., $2,000,000; Portland, Ore., $2,000,000.

School construction and additions: Spokane, Wash., $1,300,000; Los Angeles, $550,000; Perris, Calif., $500,000; Bellevue, Wash., $400,000; Bothell, Wash., $1,100,000; Seattle, $2,000,000; Parkland, Wash., $750,000; Boulder, Colo., $1,000,000; Nevada City, Calif., $1,500,000; San Jose College, $3,400,000; Albuquerque, $800,000.

City Hall, Burbank, Calif., $700,000; North Sacramento, Calif., $600,000.

Housing project, Fort Logan, Colo., estimated $8,000,000; Fort Lewis, Wash., $14,000,000; Stanton, Calif., $1,164,000.

Convention hall, motel, clubhouse, West Palm Springs, Calif., $4,000,000.

Office building, Long Beach, Calif., $4,000,000.

Medical building, Sacramento, Calif., $450,000; Torrance, Calif., $600,000.

Plant expansion, Gilsonite, Colo., $450,000.

Lime plant, Salt Lake City, over $1,000,000.

Dormitories, State College, Alamosa, Colo., $1,600,000; Greeley, Colo., $470,000; Pullman, Wash., $2,500,000; Spokane, $1,000,000.

Power plant, $1,500,000, students housing and health center, $688,000, University of Wyoming, Laramie.

Gymnasium, Western Washington College of Education, Bellingham, $1,000,000; Science building, Casper College, $425,000; Library building for Brigham Young University, Provo, Utah, $4,000,000.

Shopping center expansion, Seattle, $1,000,000; Portland, Ore., $1,000,000.

Home for chronically ill, Spokane, $1,145,000; housing for the aged, El Paso, Tex., $350,000; addition to home for the retired, La Jolla, Calif., $1,250,000; retirement home, Roseville, Calif., $3,500,000.

Department store, Renton, Wash., $1,000,000.

Industrial plant, South San Francisco, $300,000; sheet metal shop, Seattle, $600,000.

UTILITYMAN'S GUIDE TO CABLE SPLICING MATERIALS

What method do your men use to splice cable? How do they insulate joints? What kinds of materials do they use? What type of connectors?

One way to help keep construction costs, operating costs, and maintenance costs down is to make sure your workmen continue to use up-to-date splicing methods. That's why Rome Cable makes available information that can help your crews do a better job—faster.

Take the table on this page, for example . . . it tells *at a glance* what splicing materials are used for power cables. Extra copies of this table are available from your Rome Cable salesman. He is your contact for more information about the most effective materials and methods for cable splicing.

Your guide to *better* cable splicing is your Rome Cable salesman—he stands ready to help with *all* your wire and cable problems. Why not call him in today?

DESCRIPTION AND PURPOSE OF MATERIALS	Rubber Insulated Lead Covered	Rubber Insulated Neoprene Jacketed	Rubber Insulated Thermo-plastic Jacketed	Thermo-plastic Insulated Thermo-plastic Jacketed
1. Lead sleeves—for housing the joint-cut from commercially pure lead tubing.	X			
2. Copper connectors—slotted, tinned and beveled—for joining the conductors made in accordance with electrical industry standards.	X	X	X	X
3. Compression-type connectors—either copper or aluminum—used with hydraulic press and die.	X	X	X	X
4. Solder—for making wiped joints and soldering the connector, standard 60-40 grade.	X	X	X	X
5. Stearine—soldering flux.	X	X	X	X
6. Sandpaper—for preparing factory applied insulation.	X	X	X	X
7. Wooden spatula—for applying rubber cement.	X	X	X	
8. Special cement—for use under first layer of insulating and jacketing tapes in joints on rubber insulated and neoprene jacketed cable.	X	X	X	
9. Cable paint—for painting over the entire joint.		X	X	X
10. Cotton tape—for cleaning connectors, protecting and securing cable insulation, and for temporary lashing.	X	X	X	X
11. Ozone-resistant tape—for insulating joints on rubber insulated cables.	X	X	X	
12. Neoprene tape—for forming a jacket over joints on rubber insulated neoprene jacketed cables.		X		
13. Friction tape—for protecting and securing hand-applied rubber insulation in joints on rubber insulated cables.	X			
14. Anhydrous tape—for over-all protection of joints.	X	X	X	X
15. Polyethylene-base tape—for insulating joints on polyethylene insulated cables.				X
16. Pressure-sensitive thermoplastic tape—for insulating and jacketing joints on thermoplastic insulated or jacketed cables other than polyethylene.			X	X
17. Shielding braid—⅝" woven copper tinsel tinned braid—for shielding joints.	X	X	X	X
18. Grounding wire—Tinned copper—8, 10 or 12 AWG flexible strand.		X	X	X
19. Insulating compound—for filling the lead sleeve. An asphaltic base compound with suitable melting point, high dielectric strength and low dielectric loss.	X			

This table was taken from the second edition of the 393-page Rome Cable Manual of Technical Information. This new book is packed with up-to-date data on cables and materials. It contains almost all the information you need to specify, purchase, and use wire and cable. You can get your copy of the new edition by mailing $4.62 to Dept. 191-C, Rome Cable Corporation, Rome, N. Y. *Remittance must accompany your order.*

ROME CABLE

CORPORATION

KEEP THIS AD FOR FUTURE REFERENCE • TEAR ALONG PERFORATION

EW news roundup

FEATHERBEDDING—The U. S. Chamber of Commerce has listed a few of the more irrational featherbedding practices that have been forced on industry.

Unnecessary extra crewmen on trains which cost the railroads $500 million a year.

Stand-by orchestras drawing full pay for not playing a note.

Typesetters that compose everything produced by newer methods and then throw all the lead into the hellbox—a practice that cost one New York newspaper over $150,000 a year.

Bricklayers capable of laying 1,000 bricks a day are now limited to 500.

Paint brushes are limited to 4 in. in width and the use of spray guns is restricted.

Electricians limited to the number of outlets installed per house per day and carpenters refusing to hang and fit more than a certain number of doors per day. Plumbers must ride in trucks delivering materials to the job and pipe must be threaded on the job.

But this goes on and on and costs go up and up. And everybody pays in the long run—even the union member.

—EW—

Swift Dam, the world's highest completed earth-filled dam, will be used in the forthcoming edition of the Encyclopedia Britannica as representing the most modern type of earth-filled dam construction. Incidentally, the section on dams is edited by Julian Hinds, internationally known consulting engineer, who was one of the consultants on the Swift project.

—EW—

CONNECTOR GROUP—A new Overhead Distribution Connector Group has been organized within the Switchgear Section of the National Electrical Manufacturers Assn.

The new group is composed of 11 companies and is chairmanned by K. R. Way, vice-president, Jasper Blackburn Corp. In operation only a few months, the group has moved rapidly to pose solutions to highly technical utility industry problems by developing "standards for unplated, split-bolt and vise-type connectors for copper conductors."

In describing this new NEMA standards publication, Mr. Way said:

"The standard, first to be produced by the Overhead Distribution Connector Group, points out the requirements for providing good electrical and mechanical connections. Since standard surface conditions of conductors are difficult to define and obtain, minimum values of clamping force have been developed rather than maximum joint resistance.

"The standards spell out the uniform test methods and suitable equipment to be used in determining conformance of this type of connector with the performance requirements in order to assure comparable and reproducible test results. Among the data included in the standards are clamping forces, torque strength and pull-outs."

Washington Water Power Co. is experimenting with an electric car. Robert Sewell, an electrical engineer with the company, has converted a Crosley sedan. George Brunzell, WWP executive vice-president, says: "We have a long way to go yet, but we think it possible to develop a practical all-electric car." In its present stage of development, the experimental car uses conventional-type storage batteries and one motor. It can attain a speed of from 25 to 30 mph. Looking under the hood of the experimental model, from left, are Kinsey Robinson, WWP president, and Sewell

Read the Roundup for events and developments of national and international significance.

—EW—

General Electric has begun construction of an $827,000 turbine rotor balance and overspeed test facility in Schenectady. When completed, the new facility will be capable of handling the largest turbine rotors and last stage buckets contemplated in the future.

—EW—

SUGGESTION—George M. Gadsby, Utah Power & Light's board chairman, has come up with a new version of the "Something-of-the-Month-Club." He suggests that taxpayers endorse a "Congressional Savings of the Month Club," urging Congress to enact some specific fund-conserving measure every month.

It's a fine idea but, if what we hear about the current session of Congress is right, the membership in this club is liable to be very small.

—EW—

SAFETY TIP—In the December issue of the Edison Electric Institute Bulletin, S. H. Young of the Hartford Electric Light Co. analyzes the industry's accident record. While the trend since 1948 has been downward, real improvement in the record can only be made by preventing electrical shock or burn fatalities that account for approximately three-quarters of the total fatalities.

Significant, too, is the fact that of the 112 fatalities in 1957 from this

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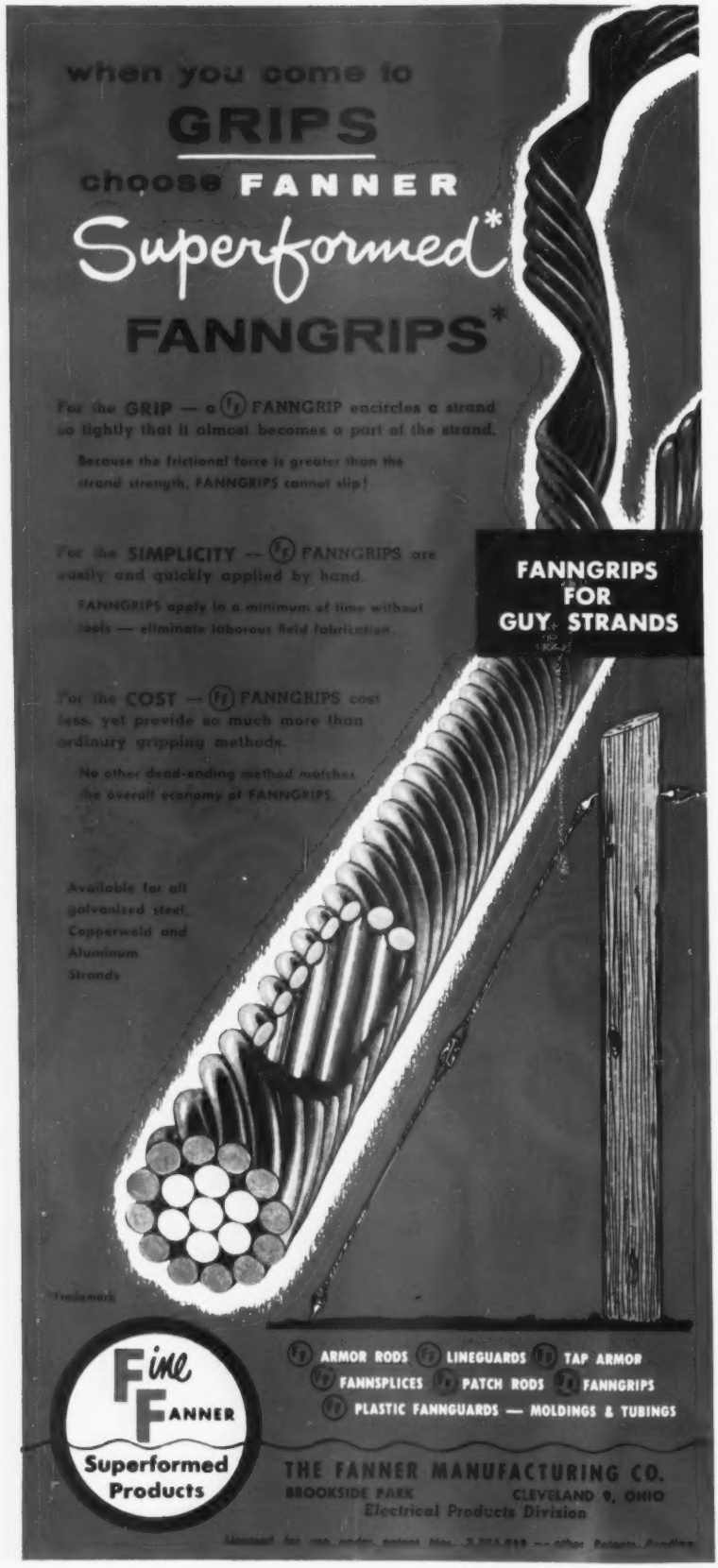
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No other dead-ending method matches the overall economy of FANNGRIPS.
Available for all galvanized steel, Copperweld and Aluminum Strands
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cause, 42 or 37½% occurred in the three months of May, June and July.

Right now is not too soon for safety engineers and supervisors to start putting on the extra pressure for safe practices that will cut down these high summer losses.

—EW—

New home of Atomic International is at 8900 De Soto Ave., Canoga Park, Calif. One of four facilities to be built, the new building is a 132,000-sq-ft concrete structure.

—EW—

EXECUTIVE CHANGES — **Grant O. Hylander,** executive vice-president of Ebasco International, has been moved up to president, succeeding **Henry B. Sargent,** now chairman of the board . . . **Robert E. Lewis** succeeds **Don G. Mitchell** as president of Sylvania. Mitchell continues as board chairman . . . **Joseph A. Ricca** has been named president and **James M. Woodman** see board chairman of Electrical Engineers Equipment Co., Hubbard subsidiary . . . **R. C. Kirk** succeeds **A. G. Steinmayer** as Line Material's research and engineering vice-president . . . **Thomas Fuller,** general sales manager of Thomas Industries, has been named a vice-president . . . Day-Brite Lighting has named **George J. Taylor** to the newly created post of vice-president and director of research . . . **Alexander S. Basil** has been made vice-president in charge of manufacturing for Rockbestos Products . . . Royal Electric has elected **Jules P. Goldsmith** to the new office of vice-president-marketing . . . Leeds & Northrup has appointed **Nathan Cohn,** one-time district manager in San Francisco, to the newly created post of vice-president-technical affairs. Also recently made vice-presidents are **Donald E. Moat,** director of marketing, and **John F. Quereau,** director of manufacturing.

—EW—

MAINTENANCE THAT PAYS — Two worth-while ideas on the value of preventive maintenance on electrical apparatus were recently presented before the AIEE. Dean B. Kiefer of the Bakelite Co. stated that preventive maintenance "provides a fruitful ground for economies" in the operation of electrical apparatus. In his paper, he emphasized the necessity for rigid safety, advanced

inspection techniques, and "careful preplanning and scheduling of work" to prevent unscheduled shutdowns.

A training program aimed at making maintenance workers more competent in their work was described by W. A. Reece in a paper entitled "Electrical Maintenance of a Large Chemical Plant." In the paper, Reece describes a training program that requires electrical maintenance people to spend about as much time studying outside of the plant as they spend in the comprehensive classroom work. In an agreement with the union, anyone in the class room who does not progress sufficiently is required to leave the maintenance department.

—EW—

The Indian railways have decided to standardize future electrification on the 25-kv, 50-cycle, single-phase a-c system. The Indian Railway Board has given an order to a British company for the electrification of approximately 420 miles of track near Calcutta on the main line to Bombay.

—EW—

NEW DESIGNATIONS—The American Standards Assn., after working with manufacturers of mercury lamps, has formulated a new system of designating them. Briefly, the ASA designation consists of the letter H followed by a number, and then followed by two letters. The number represents the transformer type. The two letters following the number define the physical lamp characteristics. Choice of these letters is strictly arbitrary. They do not follow any pattern nor are they abbreviations. The ASA system does not distinguish between various types of phosphor-coated lamps.

The new system should eliminate much of the present confusion among distributors and users when attempting to determine lamp interchangeability.

—EW—

ATOMIC MINING—Last month a meeting in Washington explored the possibility of using nuclear explosives to extract the oil from oil shale, the reserves of which in Colorado and Wyoming alone are estimated at nearly a trillion barrels.

The theory is that the explosion

UNBREAKABLE VINYL
— can't crack, chip, or break.

MOLDED-IN CONSTRUCTION
— blades, contacts, terminals locked in . . . nothing can wobble, work loose, or fall out.

DEAD FRONT CAPS
—back-wired for greater safety. No fiber washers to fuss with or lose.

NEW Unbreakable PVC ROYALOK®

ONE-PIECE CONNECTORS
— no eyelets or rivets. Double-wipe contacts permanently anchored in vinyl bodies.

RIGHT FOR EVERY JOB
— unbreakable vinyl resists acid, oil, grease . . . can't break under roughest use.

ONLY PVC ROYALOK® OFFERS SO MUCH!

SAFER, EASIER TO WIRE
— you get clean, safe wiring every time. Handy fact-tag with each device shows simple, easy wiring.

Now you don't have to tie up cash and shelf space with attachment caps and connectors of many different materials. Only one . . . the new PVC . . . has ALL the qualities necessary to make it serviceable under even the most severe conditions. Don't wait . . . order PVC – TODAY!

ROYAL ELECTRIC

ROYAL ELECTRIC CORPORATION
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SALES REPRESENTATIVES AND WAREHOUSES: Los Angeles—1950 Naomi Avenue, RI 7-9655; San Francisco—1225 Sixth St., HE 1-5792; Seattle—4130 First Ave., So., MA 3-8882; Denver—888 S. Lipan Street, WE 6-3456

Here's why you get more for your transformer dollar this year . . .

Lower Losses—Put Less Drain Per Transformer On Your System
Better Regulation—Means Higher Revenue—More Customer Satisfaction

The lower losses and improved performance of the new Kuhlman pole transformers mean lower operating costs for you from generation to ultimate user.

Lower exciting current conserves generating capacity. Lower copper and core losses put less drain on your system. Lower impedance, better regulation mean less loss of power and revenue during heavy loading hours. Take even an average 10% improvement in the above performance and multiply it by the number of transformers in your system and you'll realize the savings that is yours when you specify the *all new* Kuhlman.

Lower exciting current, lower copper and core losses, improved impedance, better regulation, all mean lower operating costs, more revenue, more customer satisfaction. If you have been waiting for the best time to buy—buy now. And buy Kuhlman. There never will be a time when you'll get more for your transformer dollar.

65th year
this year you get more for your transformer dollars

KUHLMAN POLE TYPE TRANSFORMERS

KUHLMAN ELECTRIC COMPANY General Offices: Birmingham, Michigan
Western Division: SALINAS, CALIFORNIA

would break up a large quantity of shale and the accompanying fire would enable the oil to be recovered through heat.

Known as "Operation Plowshare," the concept is still in a very nebulous stage of development.

—EW—

Benjamin P. Baker, consulting engineer for Westinghouse switchgear apparatus departments in East Pittsburgh, died in late December. In 34 years with the company, he submitted 201 patent disclosures, was awarded 104 patents, and 18 more are still pending. He received the Westinghouse Order of Merit in 1939. Chances are pretty strong that some product of his inventive mind is at work on your system right now.

—EW—

EDUCATIONAL TOOL – EEI's Committee on Relations With Educational Institutions has developed a new 32-page booklet called "Power and Progress," showing the dramatic role that the electric industry plays in the nation's progress and describes the opportunities in the industry's future.

It is especially designed for use with students, teachers, guidance counselors, employees, stockholders and members of the public interested in general information about the industry.

Prices range from 45c to 21c per copy, depending on the quantity. The Edison Electric Institute, 750 Third Ave., New York 17, N. Y., will be glad to provide further information.

—EW—

All most men want from their wives are affection, admiration, encouragement and ability to live grandly on an inadequate income.

—EW—

SNEAKY – The use of electric scooters by police department parking patrolmen in Provo, Utah, has motorists talking to themselves.

In the good old days when gasoline motor cycles were used, the putt-putt of the engine gave enough advance warning for office workers or shoppers to charge out to the meter and put another nickel in. The electric motor scooters now in use (successfully) are absolutely silent.

PLEASURE SPENT—According to the Stanford Research Institute, Mr. and Mrs. America spend about $18 billion a year on recreation, hobbies, cultural activities and self-development. In addition, they pay out about $12 billion more for various forms of recreational travel.

Also was reported that the kinds of recreational activity are changing —a move from the spectator to the participant. This results in a rapidly growing group of advocates for boating, carpentry, photography, skiing and similar sports. Surprising also was the report that money being spent on attending concerts is greater than for attendance at professional baseball games.

—EW—

John J. Kearney, formerly an *Electrical World* editor, has been appointed staff assistant and secretary of the committee on atomic power of the Edison Electric Institute.

—EW—

LAST CALL – It is time now to settle your plans if you intend to go to the Annual National Wiring Sales Conference. It is scheduled for Feb. 26 and 27 at the Jung Hotel in New Orleans.

Presented will be the national Housepower, Live Better Electrically and National Wiring Bureau programs for 1959, among other helpful and informative promotion aids.

Reservations can be made by writing directly to the hotel.

—EW—

SOUND WELDING – A new, experimental method for welding metals together simply by "stirring up" their surface molecules with powerful high-frequency sound waves has been developed by Westinghouse scientists.

The process will be known as continuous ultrasonic seam welding. Not-so-good news is that no electric current or outside source of heat is applied to the metal surfaces to fuse them together.

Well, there goes that load.

—EW—

TARGET—Industry has to create a million new jobs each year to take care of the growing labor force. It's a big project, too, because each new job requires an investment of about $13,000 on the average. A tax structure that leaves little income left for risk ventures militates against the economic expansion that will insure full employment.

—EW—

Seattle's new public library will be the first library on the Pacific Coast to have electric stairways. The $127,000 contract for four electric stairways went to Westinghouse's Elevator Division.

—EW—

HOT BOX – The job of removing 66,350 sq ft of old tile fell to Bryant "Babe" Flynn, chief of maintenance for the Corps of Engineers at Anchorage. The standard procedure, although it is dangerous, has been to use a blow torch, and that was ruled out by Wardie W. King, chief of the district's safety branch. "Why don't you use infrared heat lamps?" King asked.

Flynn bought the idea and came up with an aluminum box that has the bottom and one side removed. He installed eight 250-w infrared heat lamps on the inside of the top panel, and on the top is an ordinary electric switch. Besides doing the work efficiently and more safely, it takes one man less than the old method.

—EW—

William R. Sorgel, founder and president of Sorgel Electric Co. and well-known figure in the electrical industry, died recently in his Milwaukee, Wis., home. He was particularly noted for his pioneering in the development of larger high-voltage, dry-type transformers, then known as air-cooled transformers.

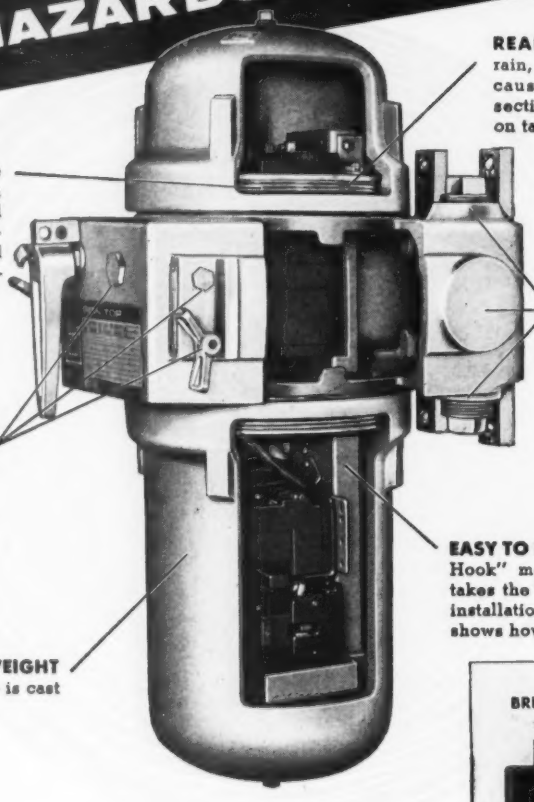
—EW—

COSTLY—According to D. J. Lambert of Vickers Armstrong Aircraft Ltd., England, it will cost some $7 per minute to keep a jet airliner circling above an airport waiting its turn to land. Naturally, he compared this with a turbo-prop plane (which his company makes), which would cost only $4 per minute.

An airline using a fleet of 20 pure jets, experiencing an average of four minutes of delay and a traffic pattern adding 10 miles to the flight distance, would find costs running more than $2,000,000 a year higher than a competitor using turbo-props.

Square D announces...

NEW SPIN TOP ENCLOSURE FOR HAZARDOUS LOCATIONS



REAL PROTECTION against rain, dust, dirt and weather because male threads on collar section engage female threads on tank.

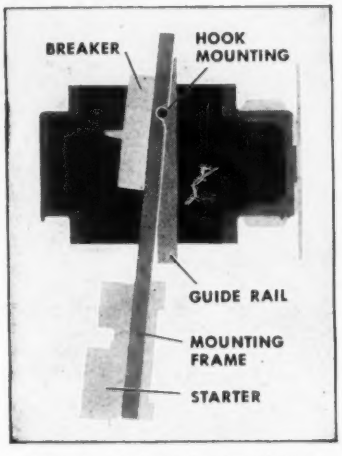
DAMAGE-RESISTING Acme thread. If you've struggled with "banged-up" threads, you'll appreciate this feature. It's always a breeze to put on and take off tanks for installation, inspection or maintenance.

INCREASED WIRING SPACE and through-feed conduit entrances for horizontal tap-offs.

EASY TO ADD pushbuttons or selector switches with easy-to-buy, easy-to-use "off-the-shelf" parts kits.

EASY TO INSTALL • "Slide and Hook" mounting arrangement takes the hard work out of the installation job. Diagram below shows how.

STRONG and LIGHTWEIGHT The complete enclosure is cast aluminum.



SLIDE and HOOK MOUNTING

4 SIZES FOR STARTERS SIZE 0 THROUGH 5

CLASS I, GROUP C and D • CLASS II, GROUP E, F, and G

The new **SPIN TOP** enclosure is available from your Square D Distributor in three ways—complete device, enclosure only, or components only...for reversing and non-reversing across-the-line starters and combination starters. And for combination and non-combination two-speed starters.

Write FOR BULLETIN 9990

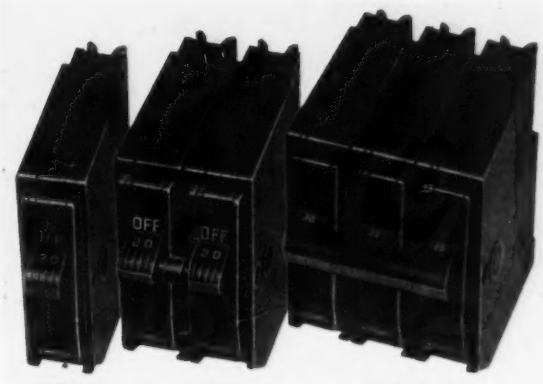
Square D Company, 4335 Valley Boulevard, Los Angeles 32, Calif.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

PRODUCT NEWS

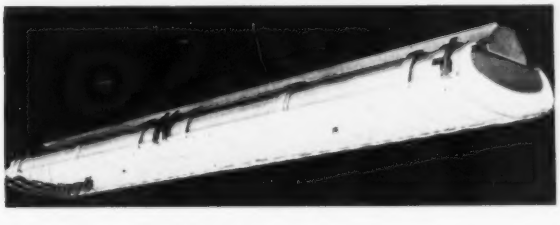
New Designs and Applications



Circuit Breakers

(1) *Square D Co., 4335 Valley Blvd., Los Angeles 32, Calif.*

A new type QO plug-in circuit breaker for protection against flash shorts is offered by this company. A time-delay characteristic is said to prevent nuisance tripping on momentary overloads and motor starting. The breakers are available in single- and three-pole forms in ratings from 15 to 50 amp, and in two-pole forms to 70 amp. Each pole is in its own case, and all cases are the same size for simple installation and maintenance. The breakers are said to be suitable for both load centers and panelboards, with two through 42 circuits.



Fluorescent Gym Light

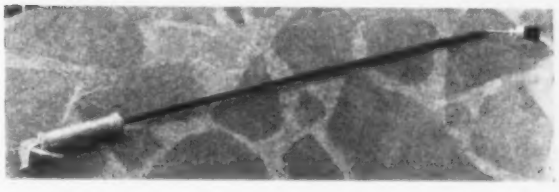
(2) *All-Brite Fluorescent Fixtures Inc., 352 Shaw Rd., South San Francisco, Calif.*

Engineered to withstand exceptional violence and impact, a completely new approach to gymnasium illumination has been announced by this company. The series of Gym Lites includes a 96-in. model for two rapid start power groove lamps, a full series of de luxe RLM models with upward component and finished in porcelain enamel, for two or three 48-in. or 96-in. slimline or rapid-start lamps. Both models are also available with baked white enamel finish. Protection is provided by an all-welded mesh guard. The guard drops on hinges from either side for easy service but cannot be accidentally dislodged. Mounting is by stem, chain or on surface. Joining is simplified for continuous rows.

Aluminum Conduit

(3) *Kaiser Aluminum & Chemical Sales Inc., 919 N. Michigan Ave., Chicago 11, Ill.*

This company announces the immediate availability of rigid conduit, couplings and 90° conduit elbows. The new products are UL listed and meet the same size, shape and tolerance requirements as those for steel conduit. Nominal diameter sizes range from ½ in. through 6 in. in standard 10-ft lengths. Larger diameters are available through special order. The conduit is chemically coated inside to make wire pulling easier. Installation costs are said to be less because the light-weight aluminum is easy to handle, train, bend and cut. In addition, fewer supports are required for installations of larger sized conduit.



Tree Sealer

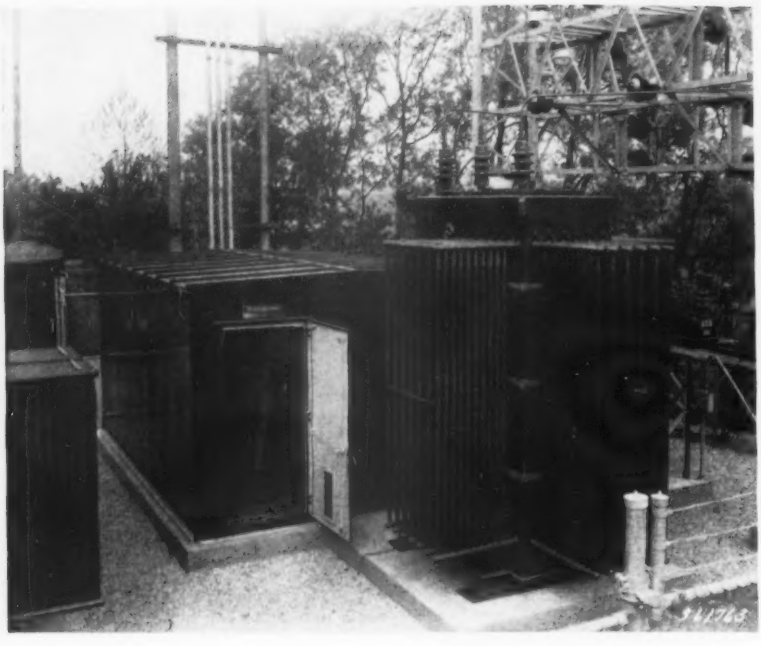
(4) *Merco Utility Supply Co., 5205 S. W. 19th Dr., Portland 1, Ore.*

This new tool, designed by George K. Merz, Portland General Electric Co., is designed so operators can seal tree wounds from the working ladder or platform at the same "range" as work done with long-handled trimming tools. Components are a reservoir and pump head, a 4- or 8-ft fiber glass tube and flexible nylon brush. The fiber-glass tube has a safety advantage because of its superior insulation characteristics.

Training Nuclear Reactor

(5) *Alco Products Inc., Schenectady 5, N. Y.*

This company has announced the commercial availability of low-cost, quick-installation small reactors for utility company training and research programs. The 2,000-kw portable plant was originally developed for the army, and is known as Army Package Power Reactor. The first unit has been in successful operation for nearly two years. The pressurized-water units are offered for training purposes that would supplement utility participation in the development of larger nuclear plants. The company is ready to discuss the reactors in more detail and is ready to make complete proposals.



Westinghouse

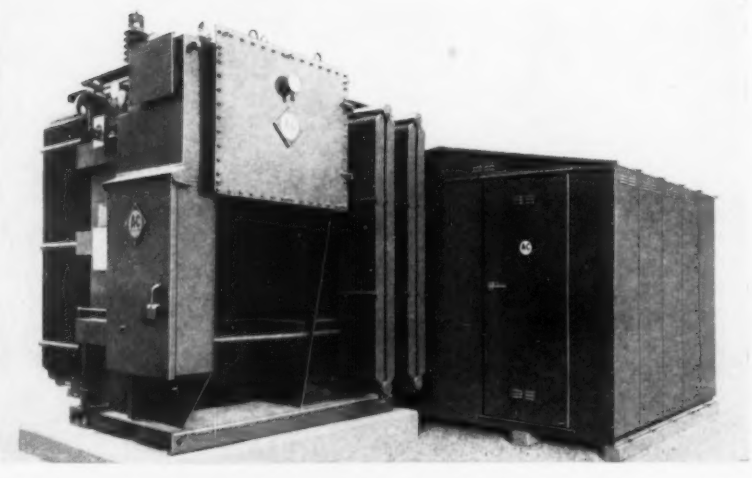
The service work area designed into this company's metal-clad switchgear is obtained by extending the end enclosure of the housing. Standard 3-ft sections provide flexibility and no vertical center supports are needed for extension widths up to 9 ft. Normally, the standard 9-ft addition provides ample space for station control batteries, tools, storage and other facilities. Location of control batteries near the breakers eliminates conduit runs and reduces voltage drops associated with long leads. The service area eliminates the need for a separate structure—often a block building erected in a corner of the station plot—and improves the over-all substation appearance.

(6) *Westinghouse Electric Corp.*, 401 *Liberty Ave., Pittsburgh* 30, *Pa.*

Allis-Chalmers

Enclosed switchgear offered by this company has a sturdy, weather-protected housing with a 75-in.-wide aisle. The weatherproof work area is on a steel plate floor with a built-in, nonsag feature. Eliminated is the need for a transfer truck. Light fixtures are over each breaker. Trunnion mounted potential transformers can be placed over the breaker unit in the superstructure for ease of inspection and aisleway accessibility, or they can be in an auxiliary cubicle when it is provided.

(7) *Allis-Chalmers Mfg. Co.*, 1126 *S. 70th St., Milwaukee* 1, *Wis.*



I-T-E Circuit Breaker

Affording exceptional ease of erection in the field, new construction for substation metal-clad switchgear offered by this company provides space for withdrawing breakers and testing and adjusting all meters and relays with complete protection from adverse weather conditions. This construction is available for single line-up or face-to-face installation with a common aisle for any low voltage 4.16- or 13.8-kv switchgear assembly.

(8) *I-T-E Circuit Breaker Co.*, 19*th and Hamilton Sts., Philadelphia, Pa.*

Announcing

ADVANCE FLUORESCENT LAMP BALLAST SERVICE WARRANTY POLICY

This ADVANCE FLB Service Warranty Policy protects against labor costs arising from an excessive number of failures directly attributed to self-contained components within an Advance fluorescent lamp ballast.

When an installing electrical contractor experiences an excessive number of inoperative in-warranty ADVANCE ballasts, the installation should be checked, to the best of the contractor's ability, in accordance with the ADVANCE FLB Service Warranty Manual. If it is found the ballast difficulties are not caused by external conditions, contact the nearest ADVANCE representative or the Marketing Division of Advance Transformer Co., 2950 North Western Avenue, Chicago 18, Illinois.

Should an Advance Transformer Co. engineering analysis reveal the inoperative ballasts fall within the provisions of this program, an ADVANCE FLB Service Warranty Authorization Form will be supplied. This form must be filled out and sent to the Marketing Division of Advance Transformer Co. for approval.

When the authorization form is approved, it will be returned and new ballasts for replacement will be shipped directly to the job location without charge. After the new ballasts have been installed, the inoperative ballasts must be returned directly to Advance Transformer Co. for complete analysis and final approval.

Invoice for allowance must be referred to the Marketing Division, Advance Transformer Co., 2950 North Western Avenue, Chicago 18, Illinois. All authorized allowances will be paid by Advance Transformer Co.

Louis Duncan
PRESIDENT

ADVANCE TRANSFORMER CO.

MAIL THIS COUPON TODAY

ADVANCE TRANSFORMER CO.
2950 N. WESTERN AVE., CHICAGO 18, ILL.

Gentlemen: Please send details on your Fluorescent Lamp Ballast Service Warranty Program.

Name_____

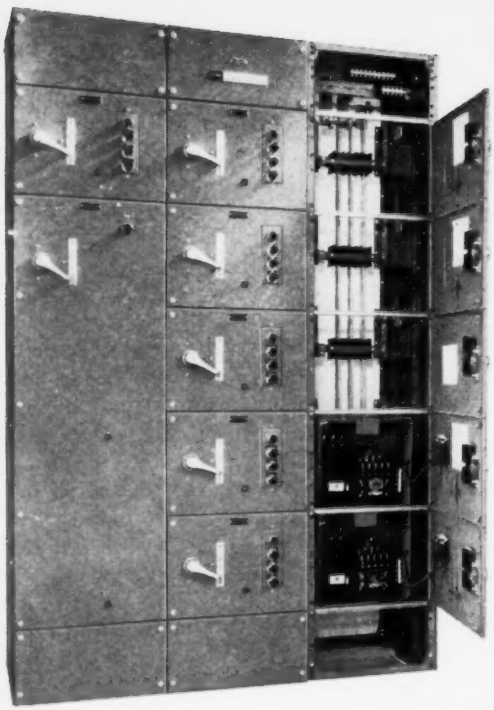
Firm_____

Address_____

City_____ State_____

In Control Centers...

Federal Pacific gives what you're looking for



RELIABILITY

BOLTED CONSTRUCTION— 11-gauge formed channels bolted together for maximum structure rigidity.

POSITIVE PLUG-IN CONTACTS— special beryllium copper alloy stabs provide high-pressure, low-resistance unit-connections to silver-plated bus.

TESTED TO WITHSTAND 25,000 AMP RMS SHORT CIRCUIT STRESSES.

FLEXIBILITY

PREPUNCHED STRUCTURES— for unmatched job flexibility...individual units or complete sections can be added, removed or interchanged to meet varying job requirements—present and future.

COMPACT DESIGN— up to 20 units can be mounted in a single vertical section.

EASY WIRING— oversize wiring spaces simplify initial installation and facilitate change of units.

SAFETY

UP-FRONT UNIT RELEASE— completely disengages unit from energized bus... can be locked in open position to prevent accidental contact.

FULLY ENCLOSED UNITS— steel barriers isolate each unit from adjacent parts.

DOORS MOUNT ON STRUCTURE— prevent accidental contact with energized bus when starter unit is removed.

Nothing has been left to chance in the design of this control center. Structure, starters, and protective devices have all been carefully engineered, manufactured and coordinated by Federal Pacific to assure the highest standard of operating efficiency and dependability—as well as to provide unified responsibility for performance. For complete details write for Bulletin 2-2000A, Federal Pacific Electric Company, General Offices: Dept. 305, Newark 1, New Jersey.

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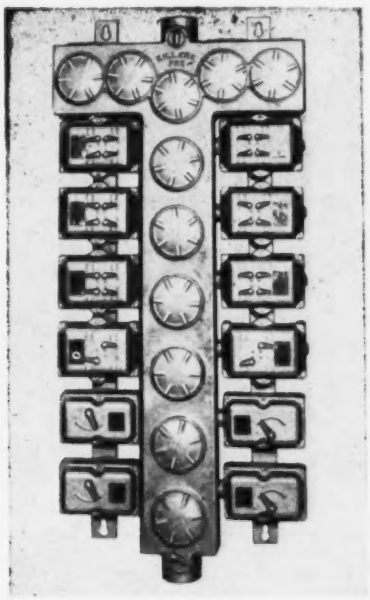
FEDERAL PACIFIC ELECTRIC COMPANY

The Best in Electrical Distribution and Control Equipment.



Prewired Panel Boards

(9) *Killark Electric Mfg. Co., Vandeventer & Easton Sts., St. Louis 13, Mo.*

A complete line of explosionproof panel boards constructed of cast aluminum is offered by this company. Available in a wide selection of sizes, they can be provided with any size protective equipment, and can be built to fit individual job requirements. They are completely wired at the factory.

Liquid-Tight Connectors

(10) *Appleton Electric Co., 1701 Wellington Ave., Chicago 13, Ill.*

A single wrench is all that is required to install the liquid-tight, flexible conduit connectors now available from this company. Lock nuts or O rings are completely eliminated. Connectors consist of a compression nut, brass ferrule, connector body and insulated throat wedge adapter. The adapter grips the wiring or junction box wall when tightened. A positive seal against liquids, fumes or foreign matter is formed by the ferrule which screws into the spiraled steel inner wall of the liquid-tight tubing and is compressed into the outer neoprene wall.

NEW!

3 in 1

Superior Cable

. . . components for

- CONTROL
- COMMUNICATION
- INSTRUMENTATION

all under one sheath!

Here's a new Superior Composite Cable that solves many power, electronic and communication problems. One cable does the work of three or four!

Control circuits can consist of any number of individual conductors, pairs or groups under the unit jacket. Communication circuits of a critical nature requiring special shielding may be combined with pairs, triples or quads of standard construction. In addition, instrumentation and/or low voltage power circuits can also be included in the basic construction.

Like all plastic insulated and sheathed Superior Wires and Cables, these new composite cables are quality-engineered and manufactured to deliver maximum efficiency at minimum cost.

Write for detailed information to

SUPERIOR CABLE

SUPERIOR CABLE CORPORATION

Hickory, North Carolina

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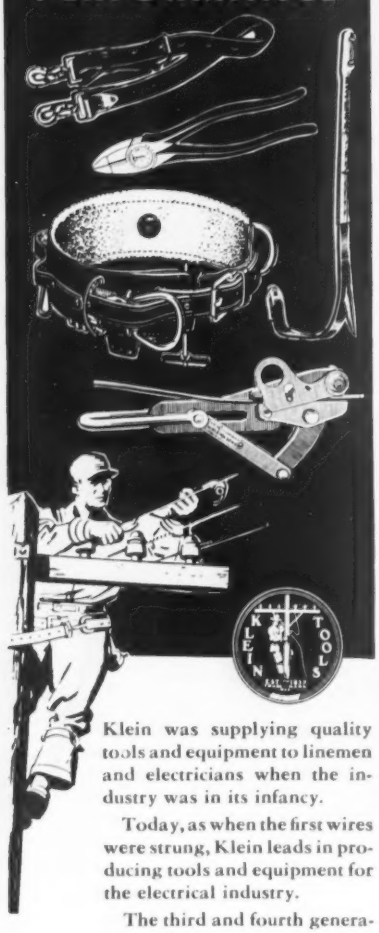
KLEIN

FOR GREATER SAFETY, BETTER PERFORMANCE



Klein was supplying quality tools and equipment to linemen and electricians when the industry was in its infancy.

Today, as when the first wires were strung, Klein leads in producing tools and equipment for the electrical industry.

The third and fourth generations of Kleins are still adhering to the quality standards set a century ago. The new Klein plant, equipped with the latest in manufacturing facilities, assures better, safer equipment, wherever power lines or communication lines are strung.

FREE POCKET TOOL GUIDE

A free copy of the new Klein Pocket Tool Guide will be sent on request without obligation.

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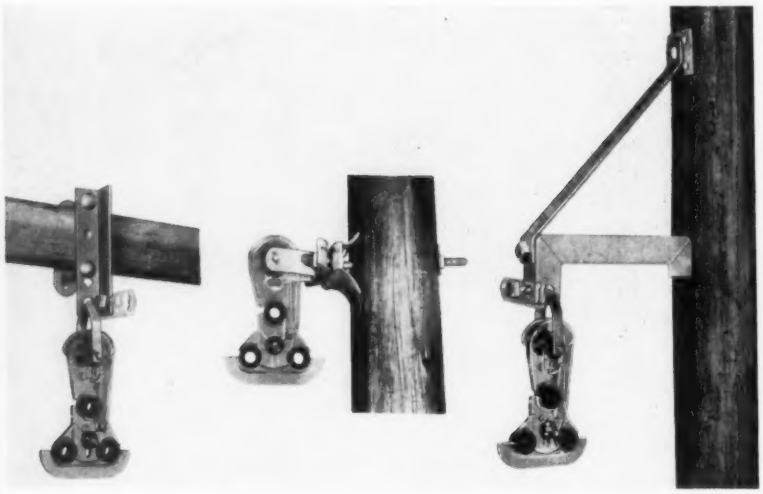
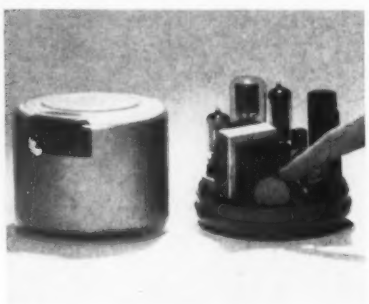
Established 1857 Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS



Suspension Hardware

(11) *Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.*

A new line of hardware for aerial cable suspension is now available from this manufacturer. The equipment is specifically designed for use with spaced aerial cable clamps. Five basic designs offer a complete range of application and include a corner bracket and suspension assemblies for crossarms, close or extended tangents and pole tops.



Photoelectric Controller

(12) *General Electric Co., Schenectady 5, N. Y.*

A new twistlock photoelectric street lighting controller and a new photoelectric luminaire hood are now available from this company. Use of a Thyrite element for protection against surges induced by lighting or line crossovers is a key feature of the new controller. This eliminates the need for external secondary arresters, according to the company.

Outdoor Luminaire

(13) *Holophane Co. Inc., 342 Madison Ave., New York 17, N. Y.*

The light controlling element in this new unit is a one-piece prismatic refractor made of thermal shock-resisting glass. Designed for use with 400-w mercury vapor or 50-w incandescent lamps. It is 16½ in. in diameter and 15½ in. in depth.

High-Temperature Connectors

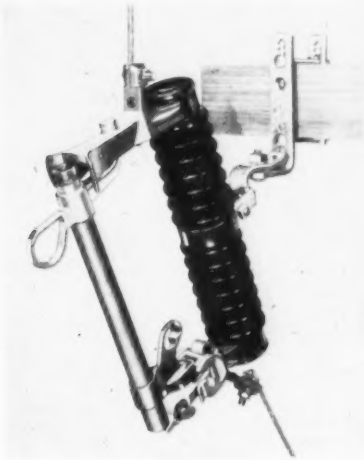
(14) *Anderson Electric Corp., Drawer 2151, Birmingham 1, Ala.*

A new series of high-temperature electrical connectors for use in high-radiation areas is announced by this company. Designed for use with remote handling equipment, the new connectors are available with various pin combinations up to 250 contacts. As a manipulator has no sensory feel, allowances have been made for misalignment up to ¾ in. and/or 15° when mating the plug and receptacle.

Insulators

(15) *Lapp Insulator Co. Inc., Le Roy, N. Y.*

A new series of line post-type insulators for horizontal mounting directly to the side of wood poles is announced by this company. The new design also provides a versatile, more economical approach to modern transmission line construction through the 88-kv range, according to the company. A pole gain, curved to fit the side of a wood pole, is incorporated into and integral with the base of the insulator. The insulator is attached to the pole by two through bolts and cannot drop below horizontal. Available with either clamp-top or tie wire heads. Clamps for the clamp-top posts are interchangeable on all units, and are available for conductor sizes .25 in. to 1.50 in.



Heavy-Duty Cutouts

(16) *James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo.*

A new line of extra-heavy-duty cutouts offered by this company has pressure-controlled venting for interrupting both low and high fault currents. Low currents are cleared by venting the gases at the bottom only of the fuse tube. High fault currents cause a disc to blow out of the expendable cap on the top of the tube, venting the gases at both ends and preventing tube rupture. Interrupting ratings are 10,000 amp at 7.8 kv, 8,000 amp at 15 kv. Load rating is 100 amp. Available on single insulator mountings from 7.8 to 27 kv, on two NEMA post insulators from 7.8 to 34.5 kv.

Complete Stock and Plenty of "Know-how"!

Your Maydwell & Hartzell representative knows his business . . . makes it a point to know yours, too. You'll find him willing and able to recommend the right equipment for every project while keeping within your budget.

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Seattle 9	306 Dexter Avenue	MAin 4-2368
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Crapo

GALVANIZED STEEL STRAND FOR GUY, MESSENGER and OVERHEAD GROUND WIRE

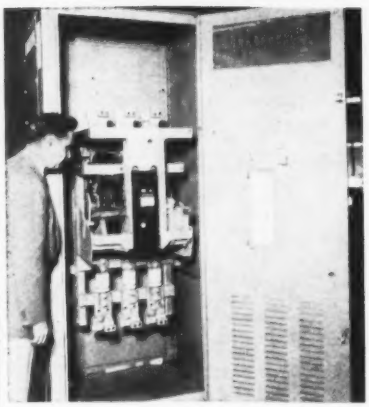
The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

INDIANA

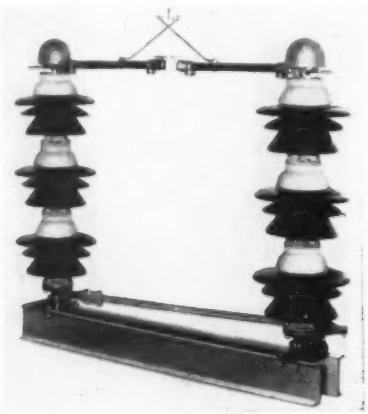
STEEL & WIRE CO., INC., Muncie, Indiana



Power Protector

(17) *General Electric Co., Schenectady 5, N. Y.*

A new low-voltage power protector for heavy-duty service entrance protection and switching is announced by this company. Designated type LB-1, the new power protector is a fully coordinated device consisting of an interrupter switch and type CLF high interrupting capacity current limiting fuse. It is available as a two-pole or three-pole unit in 240- and 480-v ratings with interrupting capacity of 200,000 RMS amps, and can also be used as a heavy-duty feeder protective and switching device.



Center Break Switch

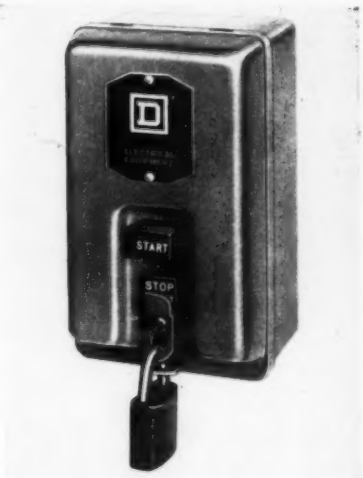
(18) *Southern States Equipment Corp., Hampton, Ga.*

Both insulators rotate while this new high pressure, center side break switch operates. It is designed for application on lines or substations for isolating, by-passing or sectionalizing service. Silver-to-silver contacts are used. It is available in voltage ratings of 34.5 kv through 161 kv, and in continuous current ratings of 600 and 1,200 amp.

Fuse Unit

(19) *S & C Electric Co., 4435 Ravenswood Ave., Chicago 40, Ill.*

A new fuse unit offered by this company is said to have an interrupting capability of 1,500,000 kva at 69 kv. A new principle in circuit interruption utilizes boric acid. With the proper fuse unit and fittings, the new SMD-2A can be used with mountings already installed for SMD-1 and SMD-2 fuses.



External Lockoff

(20) *Square D Co., Box 2115, Terminal Annex, Los Angeles 54, Calif.*

A new external lockoff arrangement is now a standard feature of this company's manual starters in general purpose enclosures. It is possible to lock the starter in the off position without removing the cover. All general purpose manual starters are now furnished with both an internal lockoff on the operating mechanism and an external lockoff.

Conduit Bender

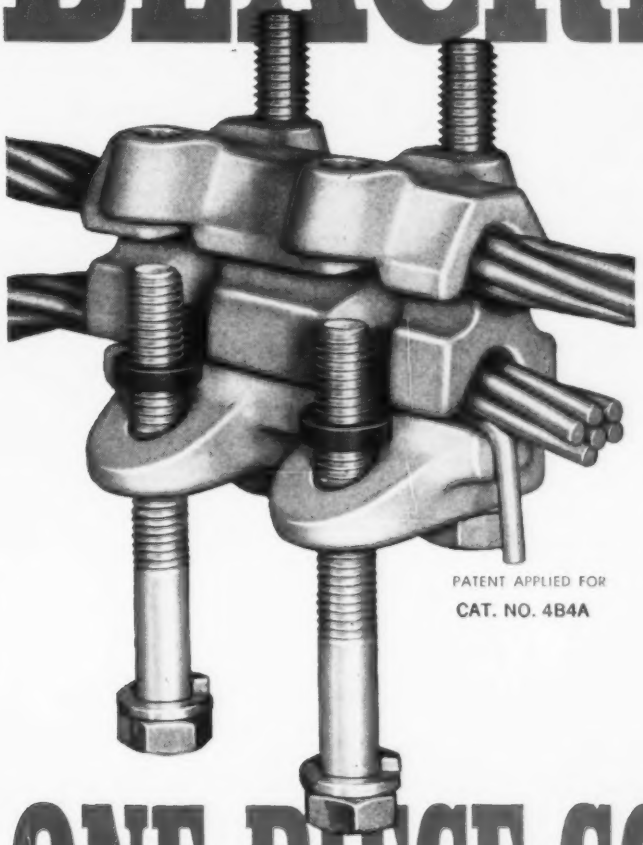
(21) *Greenlee Tool Co., Rockford, Ill.*

Ratchet action for fast, easy bending is featured on this new bender for ½-, ¾- and 1-in. rigid conduit and pipe. The unit is said to make smooth, accurate bends to 90°, and has a built-in bending gage. A swing-away pipe clamping device makes loading fast and easy.

L-M Offers

It's New! Installs quicker...easier

BLACKBURN



PATENT APPLIED FOR
CAT. NO. 4B4A

It's here... a heavy duty one-piece 4-bolt connector with all the electrical and mechanical advantages of a U-bolt connector... yet much easier to install.

No bothersome nuts, washers, housings, spacer to take apart and assemble. Just three quick, easy steps and installation is completed.

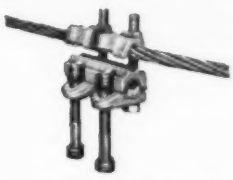
Housings are of non-copper-bearing aluminum alloy. Spacer of soft aluminum pig protects conductor, aids conductivity. Spacer treated with heavy coating of oxide inhibiting compound. Hardware is high strength aluminum alloy completely alumilited to prevent seizing.

WIDE RANGE..

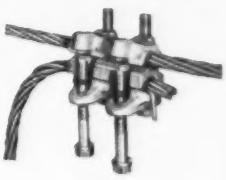
Accommodates conductors—2/0 to 397.5 ACSR—3/0 to 477 MCM

ONE-PIECE CONNECTOR

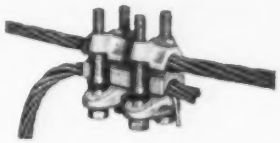
HERE'S HOW EASY THE NEW 4-BOLT CONNECTOR IS TO INSTALL



Unscrew the two free bolts contained with neoprene washers and hang over main.



Insert tap wire.



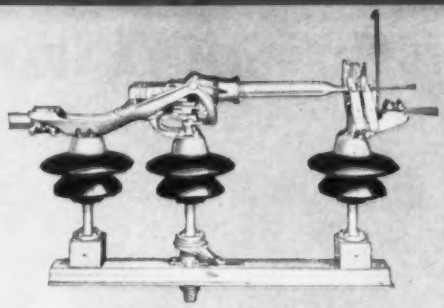
Tighten and you have the ultimate in a good connection.

Available through electrical wholesalers everywhere

JASPER BLACKBURN CORPORATION

1525 WOODSON RD., ST. LOUIS 14, MO., WYdown 3-9430

L-M Offers



VERTICAL BREAK and side break switching equipment (34.5 kv) has silver-to-silver contacts, few current-interchange points, and excellent lever advantage for breaking ice or corrosion. Bearings lubricated with silicone grease sealed in for life with silicone cord rings which are not affected by weathering or contamination. A complete line of L-M switches for vertical and horizontal mounting is available. Oil-filled load interrupter attachment for 34.5 kv vertical break switch also available.

THREE-PHASE 20/34.5 KV TRANSFORMER POLE. Three 10 kva Round-Wound transformers with 150 kv BIL are shown with L-M Type SS 27 kv arresters and 27 kv Type HDO cutouts. All this L-M equipment was specifically designed for this service.

LINE MATERIAL

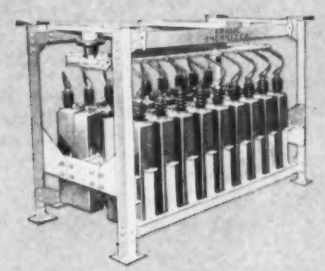
McGRAW-EDISON COMPANY

Distribution

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS
CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS

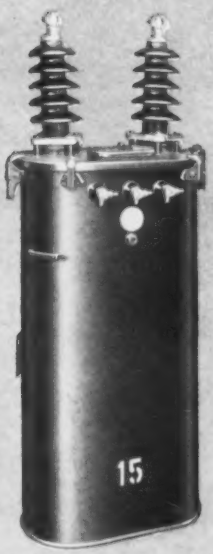
the Most Complete Line of Equipment for 20/34.5 kv Distribution

L-M'S 27 KV TYPE 5S distribution valve type arrester provides low-cost protection for 150 kv BIL apparatus.

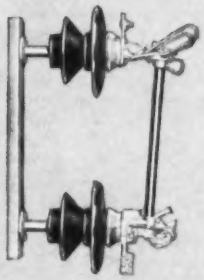


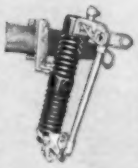
CAPACITOR EQUIPMENTS, blocks and banks to any size.

KYLE TYPE E RECLOSER, 23 kv, 150 kv BIL, in standard ratings, for single-phase extensions of the 20/34.5 system where the potential across the recloser will at no time exceed the maximum design voltage of 25.8 kv.



20 KV ROUND-WOUND® TRANSFORMER, specifically designed for this service, with 150 kv BIL, high overload capacity, low exciting current, and low losses.





TYPE HXO POWER FUSE (left) and Type HDO fuse cutout. The 27 kv, 100 ampere HDO has a rated interrupting capacity of 4000 amperes. The 38 kv, 200 ampere HXO has a rated interrupting capacity of 5000 amperes.

How 34.5 kv Distribution Cuts Costs... Here's Data on Methods, Materials

- Idaho Power Company pioneers 20/34.5 kv distribution, with ten years' experience.
- L-M pioneers, with research and development on apparatus, construction materials, and application for this economical distribution voltage.

by J. R. McDONALD, Field Engineer
Line Material Industries

Complete elimination of subtransmission, with fewer substations, higher feeder loading, and reduction of regulating equipment, resulting in lower cost per kva of installed capacity, appear to be among the major advantages afforded by 20/34.5 kv distribution, according to Idaho Power Company.

This progressive company now operates 275 pole line miles at this higher distribution voltage, and is expanding the system to serve additional farm customers. Idaho Power has found economical methods for conversion, and its experience is being generously offered to the industry. At the same time others, such as H. L. Hess of the Public Service Company of Indiana, Inc., have published the results of their studies.

L-M Provides Information, Apparatus

L-M has collected some of this data, and is offering a compilation, along with information on the apparatus and equipment L-M engineers have developed in working with Idaho Power Company and others.

Mail This Coupon For More Information

Ask your L-M Field Engineer for copies of papers L-M makes available on 20/34.5 kv distribution, or mail the coupon—and we will send them promptly—no obligation.

LINE MATERIAL Industries, Milwaukee 1, Wisconsin E-29

Please send, free, copies of the following papers:

- ☐ 20/34.5 kv—An Economic Solution, by Don E. Haasch, Special Studies Engineer, Idaho Power Company
- ☐ 34.5 kv—A Possible Future Necessity, by H. L. Hess, Distribution Engineer, Public Service Company of Indiana, Inc.
- ☐ 20/34.5 kv Multi-grounded Wye Distribution System, by George W. Cooper, Line Material Industries
- ☐ Relative Merits of 20/34.5 kv Distribution by D. L. Andrews, Distribution Studies Engineer, Idaho Power Company
- ☐ The Long-Bus Substation, by D. L. Andrews, Distribution Studies Engineer, Idaho Power Company
- ☐ SEND ALL FIVE PAPERS PLEASE, IN FOLDER IMPRINTED WITH MY NAME

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resists water...like KERITE INSULATION

It's the **KERITE** *that makes the difference*

KERITE CABLE

30 Church Street, New York 7.
Branches in Ardmore, Pa., Boston, Cleveland, Chicago, Houston, St. Louis, San Francisco, Glendale, Cal.

BULLETINS ETC.

(22) MOTOR STARTERS—Design and construction features of Allis-Chalmers automatic reduced voltage starters are described in a new bulletin released by the company. The bulletin carries descriptive copy on the theory and operation of low-voltage starters. Write to the company at Milwaukee 1, Wis. Ask for bulletin 14B8192.

(23) POWER SWITCHES — Bulletin PSE1 available from Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis., describes type PV power switches. Complete information on switches rated at 600 or 1,200 amp and having voltage ratings from 7.5 kv to 69 is given.

(24) QMOB CATALOG — Federal Pacific Electric Co.'s new line of quick-make quick-break fusible switches and panelboards is described in bulletin 3-230, which is now available. The address is 50 Paris St., Newark, N. J.

(25) GYM LITES — A four-page catalog devoted to All-Brite's new series of Gym Lites is now available. The fixtures are designed for Power Groove lamps. Outstanding feature is the heavy all-welded mesh guard to protect the lamps. Write to All-Brite Fluorescent Fixtures Inc., 352 Shaw Rd., South San Francisco, Calif.

(26) METAL-CLAD SWITCHGEAR—A new bulletin describing in detail its line of 4.16-kv metal-clad switchgear has been published by I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia 30, Pa. The bulletin covers the complete line of indoor and standard and walk-in outdoor-type equipment with ratings through 3,000 amp continuous current and 350-mva interrupting capacities. Ask for No. 2804-1A.

(27) TWO CATALOGS—James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo., is offering two new catalogs. First is catalog 13 listing compression fittings for all ACSR, aluminum and copper open-wire distribution connections, plus mechanical and hydraulic installing tools. The other is catalog 1A showing a full line of open-type drop-out distribution cutouts.

(28) CABLE MANUAL—A new manual on solid-type paper insulated power cable has been issued by Okonite Co., Passaic, N. J., and is now available. In addition to product information and technical material, the company's quality control procedures and research activities are described. Ask for bulletin 1102. It contains 152 pages divided into five basic sections.

(29) MODERNIZATION IDEAS—"59 Ideas for Modernization in '59" is the title of a new 20-page booklet available from Allis-Chalmers Mfg. Co., Box 512, Milwaukee 1, Wis. In all instances, product developments described have been covered in news releases, but the booklet serves to consolidate the information. The bulletin number is 25B9084.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after April 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

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*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

Concrete tight! Every size connector and coupling up to 2". Why settle for ordinary fittings when ETP gives you all this:

- New sparkling Zinc Chromate over-plating for lasting permanence. Salt spray tested to retard corrosion.
- Exclusive pre-set, deep-slotted STAKED screws. No backing out for conduit.
- Concrete tight with heaviest gauge wall thickness. U.L. file card E24788.
- Precision bevelled edges with extra heavy duty locknut.
- One piece solid tubular steel—cannot open or spread. Sized for uniformity.
- Available in ½", ¾", 1", 1¼" (one screw type) and 1½" and 2" (two screw type)

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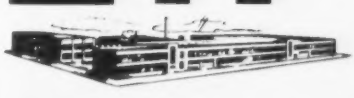


ELECTRIC TUBE PRODUCTS
74-16 Grand Avenue, Maspeth (N.Y.C.), N. Y.

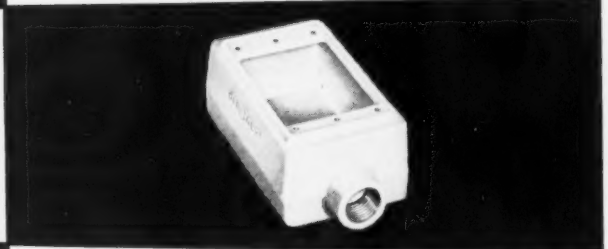
Cut costs... without cutting corners! Specify... GEDNEY CONDUIT BODIES

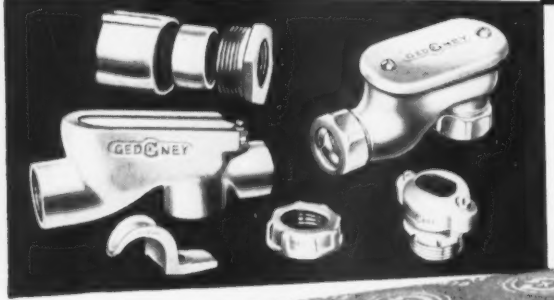
Gedney Conduit Bodies mean lowest installed cost! That's because they are skillfully made of tough, *malleable* iron, then hot-dip galvanized, and finally, they must pass the toughest inspection. Accurate machining and threading assure easiest installation . . . ruggedness assures longest service life!

THE GEDNEY CONDUIT BODY LINE INCLUDES ALL TYPES—SIZES ½" TO 4"

TYPE LB—Threaded—for heavy-wall rigid conduit. Use them with Gedney entrance fittings, straps, clamp backs to get an *entire* conduit system that is hot-dip galvanized.

TYPE FS—Threaded—shallow bodies for heavy-wall rigid conduit. Hot-dip galvanized finish prevents corrosive deposits—means easier installation, longer life.





SCORES OF OTHER GEDNEY FITTINGS are available for every purpose—all carefully designed, manufactured and inspected to assure economical installation and maximum customer satisfaction.

GEDNEY FITTINGS FIT

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ELECTRIC COMPANY
GEDNEY
RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

With 25 years of proven neoprene performance Okonite continues to use it for the tough jobs

For more than 25 years, The Okonite Company has used Du Pont neoprene to protect cable. They know that neoprene coverings stand up under these service conditions: temperature extremes, sunlight and weathering, ozone, corrosive atmospheres, contact with oil and grease and many chemicals. Underground, too, a neoprene jacket resists soil acids and prevents deterioration from galvanic action.

Neoprene's time-proven dependability is your guarantee that above or below ground, you can be confident of long service life when you specify cable jacketed with neoprene.

E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept., Wilmington 98, Delaware.

St. Lawrence power crosses Lake Champlain. The underwater circuit consists of four Okonite 115,000-volt cables. The underground sections from shore line to terminal are protected against soil acid, alkali and moisture with jacketing of Du Pont neoprene.

DU PONT
REG. U. S. PAT. OFF.

SYNTHETIC RUBBER

NEOPRENE
HYPALON®
VITON*
ADIPRENE®

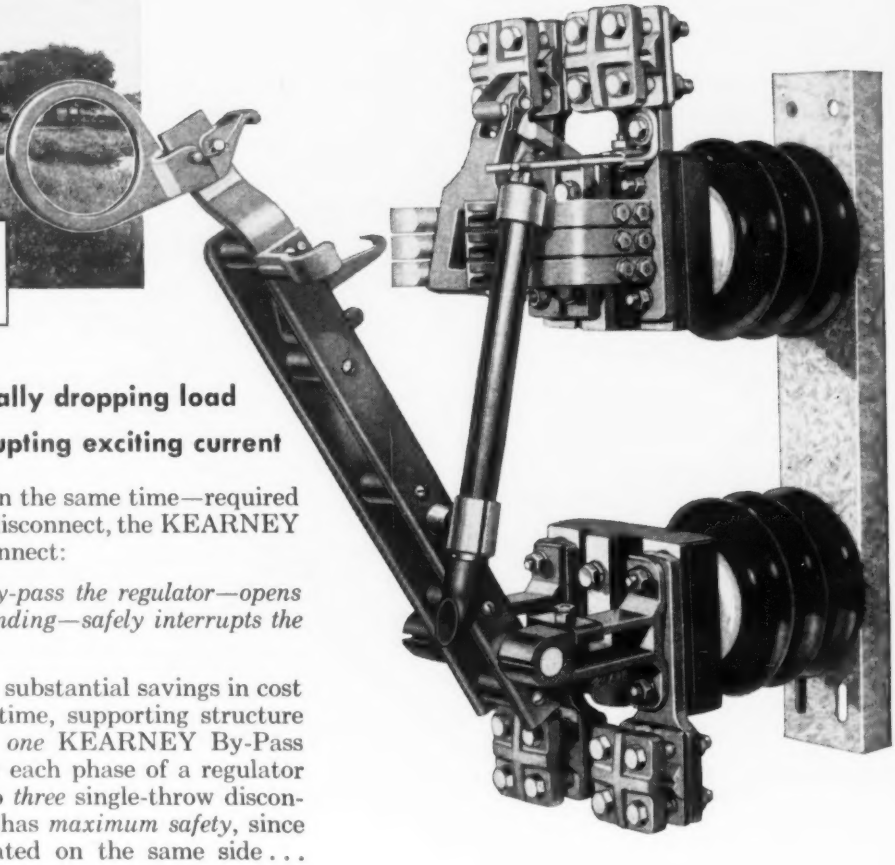
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

* Trademark for Du Pont Synthetic Rubber

Safe performance

of 4 operations in proper sequence assured by KEARNEY *REGULATOR BY-PASS* DISCONNECT

KEARNEY Regulator By-Pass Disconnects in a 15,000 volt, 3 phase, open delta regulator installation.



- **no danger of accidentally dropping load**
- **no hazard from interrupting exciting current**

With the same motion—in the same time—required to open *one* conventional disconnect, the KEARNEY Regulator By-Pass Disconnect:

shunts the line leads to by-pass the regulator—opens both leads to the series winding—safely interrupts the exciting current.

What's more, you realize substantial savings in cost of switches, installation time, supporting structure and leads, because *only one* KEARNEY By-Pass Disconnect is needed for each phase of a regulator installation, compared to *three* single-throw disconnects. And the operator has *maximum safety*, since all switches can be located on the same side . . . visible from one point!

JAMES R. KEARNEY CORPORATION, *General Offices:* **4224-42 Clayton Avenue, St. Louis 10, Missouri**

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, Inc.,** Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix.

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SAFER MAINTENANCE
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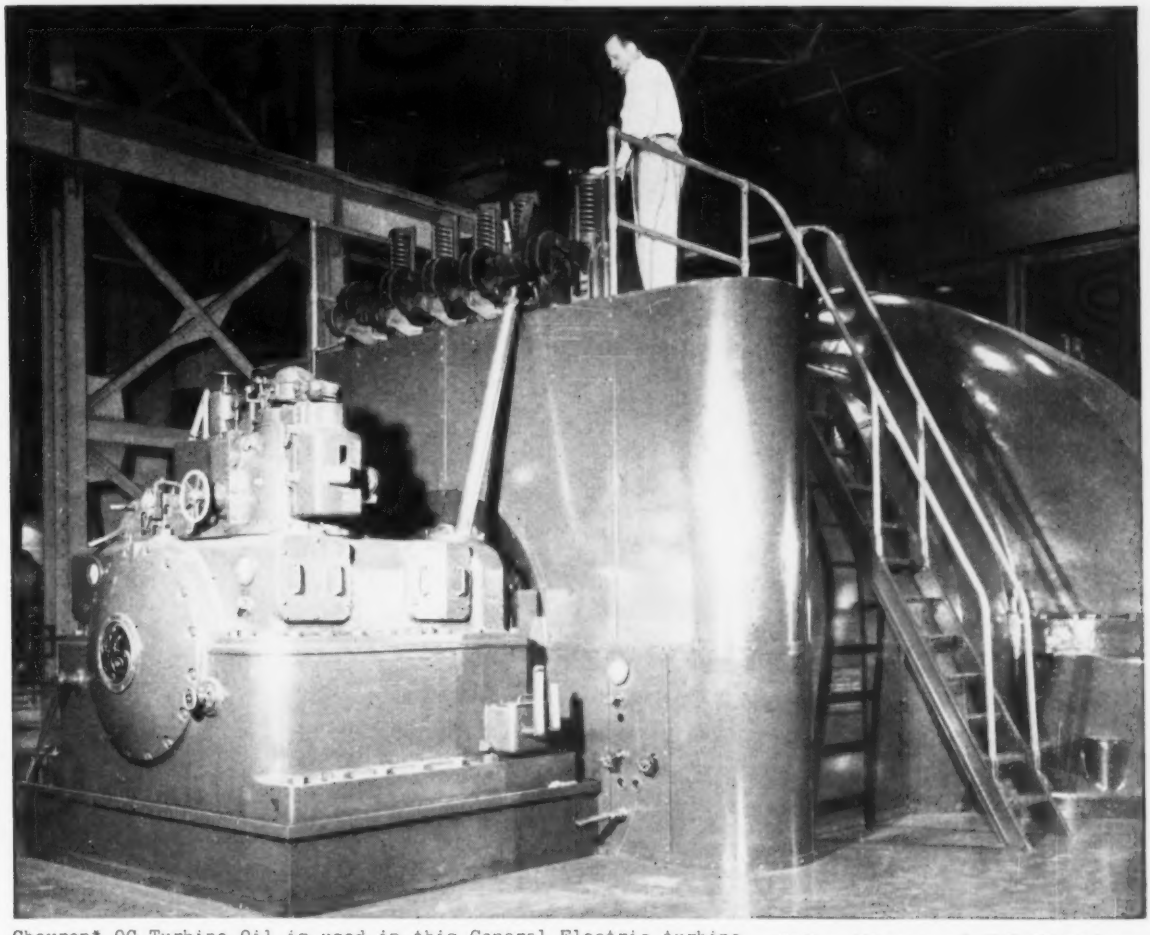
STANDARD ENGINEER'S FIELD REPORT

LUBRICANT CHEVRON* OC TURBINE OIL

FIRM U.S. STEEL CORP. Geneva, Utah

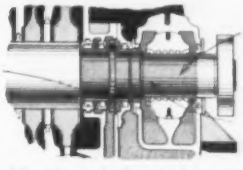
Oil Neutralization No. only .07 after 100,000 hours



Chevron* OC Turbine Oil is used in this General Electric turbine which is the principal source of power for United States Steel Corporation's mill at Geneva, Utah. After 100,000 hours operation the oil in this 50,000-kw turbine-generator showed a neutralization number of just .07—identical with the number of the original 7,000 gallon charge made in 1943. During regular inspection and servicing periods, the oil was drained, purified, and put back in service. No "sweetening" of the oil, and no other down time was required during the entire 100,000 hour period. Chevron OC Turbine Oil is also used in mill's four 11,350 hp turbo-blowers.

For More Information about Chevron OC Turbine Oils call your Standard Representative, or write 225 Bush Street, San Francisco 20, California.

Why Chevron* OC Turbine Oil prevents sludging, rusting and wear



- Excellent metal wetting ability keeps oil on bearings and gears under heaviest loads
- Oxidation inhibitor prevents sludge, gum, and lacquer formations
- Corrosion inhibitor stops rusting

*The Chevron Brand covers the line of industrial products formerly sold under the Calol name. This is a name change only. The high quality and specifications remain the same.

CHEVRON Industrial Lubricants

TRADEMARK "CHEVRON" AND DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA

PACIFIC BOILER FEED PUMPS

CONTINUOUS POWER... a *must* in Southern California Edison's giant El Segundo steam station. Three Pacific boiler feed pumps were placed in operation for unit No. 1 in 1955. Two more Pacific pumps were selected and went on the line for unit No. 2 in 1956. The combined generating capacity of the two units is 350,000 kilowatts. These Pacifics, each delivering 685,000 lbs./hr. of 360°F. feed water at 2350 PSIG, unfailingly serve Southern California Edison's El Segundo plant needs. Whenever continuous boiler feed service is an absolute must... then nothing but the best, most dependable service will do... Pacific Boiler Feed Pumps!

Write for Bulletin 122

PACIFIC PUMPS INC.

HUNTINGTON PARK CALIFORNIA

Offices in all Principal Cities

ONE OF THE DRESSER INDUSTRIES

PACIFIC®

BF-26

Electricity gives your family loads of hot water for 10¢ a day
With a modern electric water heater, there's nothing to wear out. No flame, no fumes, no venting. And a family of four can enjoy all the hot water it needs – for pennies. When are you going to move up to an electric water heater?
SOUTHERN CALIFORNIA Edison COMPANY
And remember... a modern electric water heater is part of the original equipment you'll find in every Gold Medallion Home.
The more all-electric homes there are, the more appliance sales there will be ...FOR YOU! And EDISON is helping it happen
In a Medallion Home you live better electrically –for pennies!
MEDALLION HOME
LIVE BETTER ELECTRICALLY

Before you buy another

transformer... COMPARE FEATURES

General Electric—alone—offers <u>all</u> these exclusives which add up to reliability, long life, less maintenance for you

General Electric innovates to earn your orders. So compare these features with competitive features to determine your best transformer buy.

Be sure to compare *all* features. You'll see that only General Electric offers *all* these exclusives: Formex* wire; AL CU terminals; strenicor clamps; stainless-steel bands and nitrile rubber gaskets; valve-type arresters—so that the sum of individual features adds up to greater value in long, reliable life.

Before you buy another distribution transformer, compare features—give your transformer manufacturer credit for the extra values he gives you. General Electric Co., Schenectady 5, N. Y. 431-81

* Reg. trademark of G.E. Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC

GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU

		G.E.	OTHER MFRS.			
MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
CHECK SERVICE—24-hour shipment? repair and uprating? emergency assistance?						
COMPARE FEATURES—how many exclusive features in terms of longer life; reliability; easy maintenance?						
ANALYZE PRICE—does Co. hold line against inflation with significant product developments?						
EVALUATE INNOVATIONS—has Co.'s research paid off for you? Recent examples?						

FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

It's easy to find out. Walk past your window as a disinterested passer-by. Glance in. Do you see a confusing reflection of cars, pedestrians and out-of-focus merchandise? There's a simple solution to this reflection problem. *Good lighting technique.* For example: a soft luminous background that offsets outside brightness. The result is a window that attracts . . . stops . . . sells!

A P. G. and E. Lighting Engineer will be glad to advise you on how to light your show windows in the most attractive and effective manner. Just phone a nearby P. G. and E. office for this free service.

SELL BETTER — electricity is cheap in California

P·G and E·
Pacific Gas and Electric Company

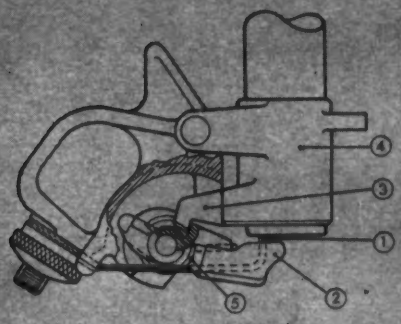
Slam it shut!

S & C's XS Cutout doesn't break the fuse link

It's standard practice for the lineman to slam the fuse tube into the upper contact. There's always a chance that he may be closing in on a fault, so a decisive thrust is required. But when the fuse tube slams into place, the thrust is transferred downward, tending to collapse the toggle and break the fuse link.

S&C's Type XS Cutout has been designed to prevent such link breakage. Instead of using the fuse link itself to restrain the toggle, the XS Cutout uses the cable *flipper* (see illustration, left) to *lock* the toggle in place until the fuse link melts. Yet this locking action in no way impairs the high-speed flip-out of the link cable during circuit interruption. The flipper, powered by a husky torsion spring, insures split-second terminal separation.

The XS Cutout can be used with LOADBUSTER®, S&C's Portable Loadbreak Tool, permitting full load switching with the cutout at no extra cost. For full information, write for Descriptive Bulletin 511, S&C Electric Company, 4425 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.



Cutaway view of lower end of the XS Fuse tube showing how fuse link cable (1) holds cable flipper (2) against locking member (3) on ferrule (4). Through this lever system, the fuse link receives only 1/30 of the downward thrust on the fuse tube. Note flipper-actuating torsion spring (5).

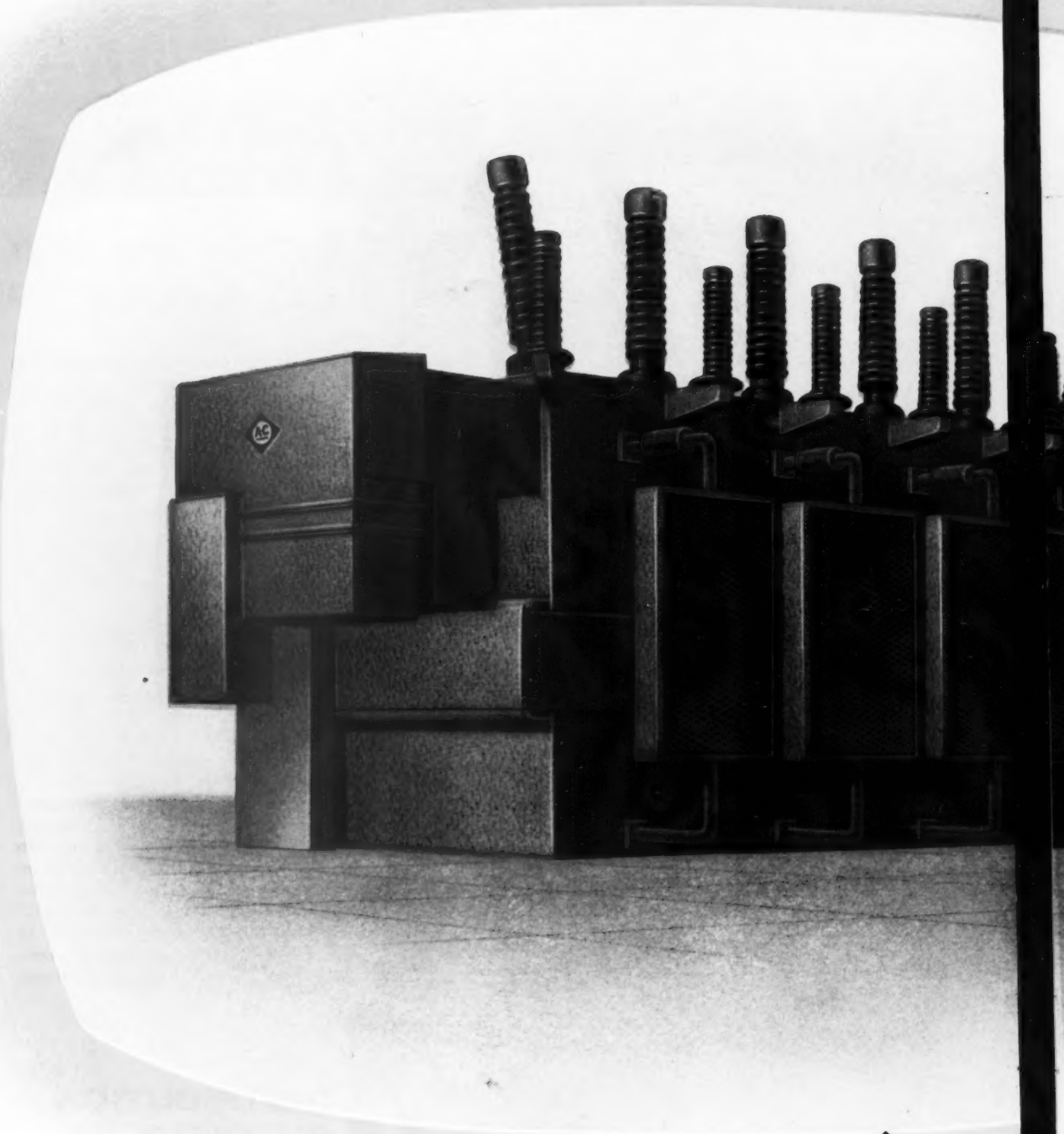
Specialists in High-Voltage Circuit Interruption Since 1910

S&C

DISTRIBUTION CUTOUTS

Disconnects • Cutouts • LOADBUSTER® Load Interrupters • Metalclad Switchgear Fuse Links • Power Fuses

Another example of



A-C
ALLIS-CHALMERS
A-5865

Allis-Chalmers leadership in transformers

404,250-kva Transformer for Crawford Station

A LARGE three-phase transformer — perhaps the largest — was recently ordered by Commonwealth Edison Company for delivery to Crawford Station in 1960.

The transformer is designed to fit the limited space available between two buildings at Crawford Station. It will also be sized to permit shipment as a complete unit with only bushings and *Electro-Coolers* removed for shipping.

This transformer will weigh about 660,000 pounds and have an equivalent two-winding capacity of 404,250 kva.

Rating of the low voltage winding is 385,000 kva at 12,600 volts. Its two high voltage windings are each rated 211,750 kva and will feed two 138-kva systems. Plus or minus 10 percent load tap changers will be provided for each high voltage winding.

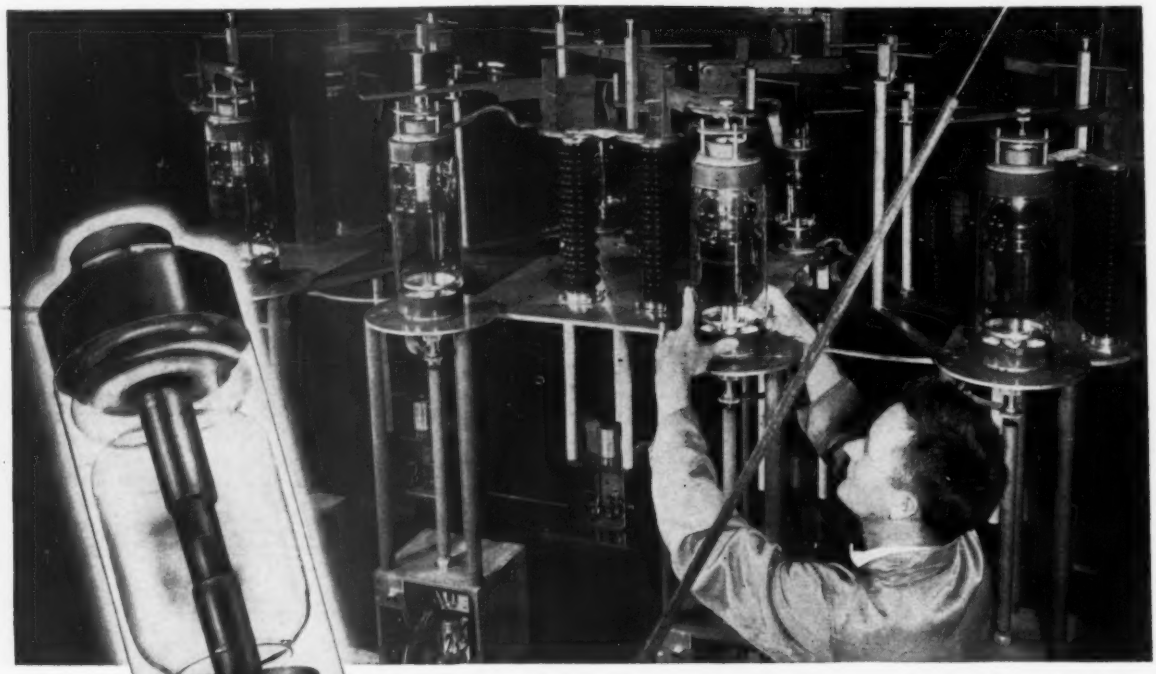
The trend to modernization of power stations is being accelerated by the economies of these larger transformers, as well as bigger generating units.

For further information about the design, building and testing of Allis-Chalmers power transformers, call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Electro-Coolers is an Allis-Chalmers trademark.

FEBRUARY 8-14, 1959

ALLIS-CHALMERS



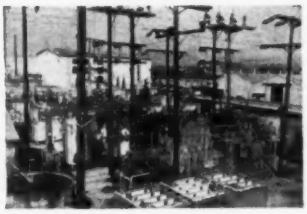
Here's why VACUUM POWER SWITCHES provide positive, unfailing operation—*every time*

Since vacuum switches represent a distinctively new approach to power switching we feel a responsibility to provide the utmost certainty of operation to each switch leaving our plant. To accomplish this each Jennings Vacuum Power Switch is tested more than 100 times at full rated voltage and load current. In addition, continual life tests are being conducted up to the full capabilities of each switch using capacitive, inductive, and resistive loads.

In order to make these tests possible and to insure perfect operation of every switch, Jennings has gone to unusual lengths to provide more than adequate testing and research facilities.

As an example, Jennings High Voltage Lab has 680,000 kva available with over 6500 amperes at 60 kv for short circuit testing. Up to 2500 short circuit amperes can be developed at 120 kv and surge current tests of 200,000 amperes can be run at low voltage. Since our vacuum power switches are particularly effective in switching capacitors, the equivalent of 20,000 kva of capacitors at voltages up to 230 kv is available for testing. Our vacuum switches can also be tested with 30,000 kva of pure inductive load at voltages up to 115 kv.

Vacuum power switches have inherent advantages that allow them to perform many difficult tasks that cannot be performed by conventional switchgear, but reliability remains its foremost quality. Jennings unusually complete testing facilities and a record of hundreds of successful vacuum switch installations in the power field are your insurance that the vacuum switch is more than capable of performing the function at which it is rated.



Substation and high voltage laboratory at Jennings Manufacturing Corporation

Interior of high voltage laboratory

We have prepared literature describing the ten sizes now available for power use. Send for your copy.

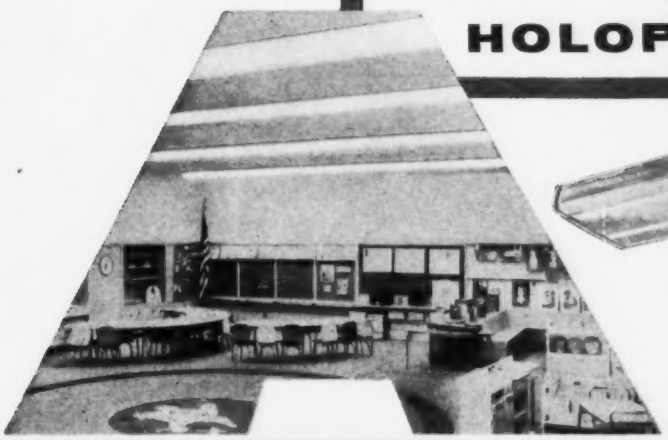
JENNINGS RADIO MANUFACTURING CORPORATION • 970 McLAUGHLIN AVE., P. O. BOX 1278 • SAN JOSE 8, CALIFORNIA

Jennings®

Simple Formula . . . for Efficient, Thrifty Classroom Lighting

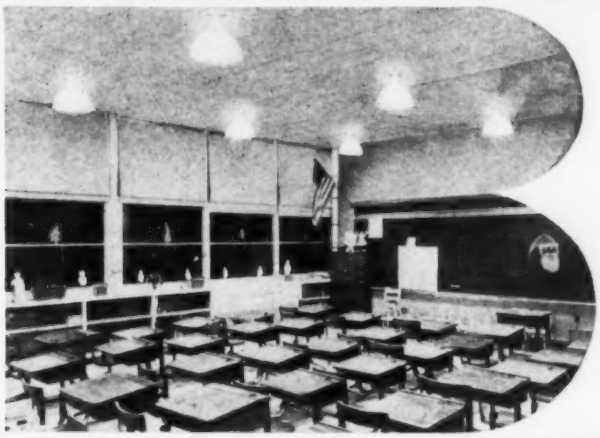
Specify

HOLOPHANE Luminaires



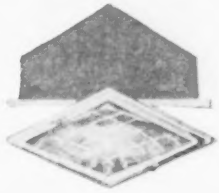
REALITE* PRISMALUME* CONTROLENS*

Provides high level fluorescent illumination with best visual comfort. PRISMALUME (acrylic plastic) enclosure; ultra-thin, light in weight, shatter resistant, free from discoloration. Annual cost-per-footcandle is low—warranting wide use of this quality luminaire.



PARADOME*

Very efficient, totally enclosed semi-direct luminaire for incandescent lighting. Prismatic control achieves highest utilization of light with greatest seeing comfort. In terms of light delivered —its cost is lower than any comparable luminaire.



LO-BRITE* CONCAVE CONTROLENS*

Pioneer development in incandescent lighting. By employing a prismatic reflector and CONTROLENS, this recessed luminaire directs maximum light on the work areas. Exceptionally low brightness; dirt-resistant; low depreciation; easy servicing.

Holophane

*®

We invite your inquiry for engineering analyses proving that Holophane luminaires offer the answer to taxpayers' demands for lighting economy.

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898

342 Madison Ave., New York 17, N.Y.

THE HOLOPHANE CO., LTD., 418 KIPLING AVE. SO., TORONTO 18, ONTARIO

KILLARK FITTINGS USED IN NEW

Mike Roth of Roth Electricians, Electrical Contractor, and Howard G. Parker of Parker Engineering & Construction Company, inspect a battery of Killark push-button and pilot light units of the explosion-proof type.

a. 2XPLBM Pilot Light and Push-Button Station

b. XTB Conduit Body

Killark

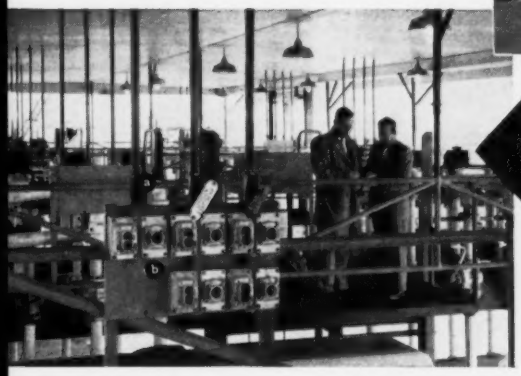
KILLARK ST. LOUIS

ELECTRIC MANUFACTURING COMPANY

Vandeventer and Easton Aves. St. Louis 13, Missouri

UNION OIL DISTRIBUTION TERMINAL

Where Peak Safety...Maximum Durability ...Minimum Maintenance Are Necessary



The entire plant and facilities of this Terminal installation at Richmond, California, were designed and constructed by the Union Oil Company of California under the direct supervision of Howard G. Parker, now President of the Parker Engineering & Construction Company. They recognized the need for permanence and safety on the job. So they called for the high-quality and high-level performance found in Killark fittings and fixtures: non-sparking safety . . . non-rusting, non-corroding durability . . . and high strength of Killark's exclusive Alumalloy construction.

Surrounding Parker and Roth is further evidence of Killark stand-by safety . . . again, a control panel of push-button stations (center, foreground), with Killark fittings bringing conduit to them.

a. EY Conduit Fitting
b. 2XPLBM Pilot Light and Push-Button Station

Safe, efficient light that also offers strength on the job and complete freedom from rust or corrosion—these are the features offered by the Killark Explosion-Proof fixtures shown here. The new Series "H" fixtures have been designed to provide even greater lighting efficiency (with auxiliary reflector) and greater safety (with unique air-cooled operation and more rugged body-construction).

a. HXGSD Explosion-Proof Fixture
b. GECTT Junction Box

The need for rugged, heavy-duty performance is clearly shown in this electrical installation. Included in the day-in-day-out demands of this job can be seen many Killark fittings and fixtures—from small union fittings to husky junction boxes.

a. UM Union
b. EY Sealing Fitting
c. GRD Junction Box (with sealing cover)
d. XPBM Push-Button Station
e. XLB Conduit Fitting
f. VA-2106 Vapor-Tight Light Fixture

KILLARK REPRESENTATIVES

SAN FRANCISCO—F. M. Nicholas Co., 714 Harrison St., San Francisco, California
LOS ANGELES—Kenneth Anderson Co., 123 South Myers St., Los Angeles 33, California
SEATTLE—Northwestern Agencies, Inc., 4130 First Ave., South Seattle 4, Washington
DENVER—Kenneth B. Schumann Co., 1073 Galapago St., Denver 4, Colorado
PHOENIX—Kenneth Anderson Co., c/o Mr. Melvin C. Long, 422 South 7th Ave., Phoenix, Arizona
HONOLULU—Matt Cabot & Associates, P.O. Box 3708, Honolulu 11, Hawaii

Control Cable Savings Begin with Small Diameters

SPECIFY & BUY ROCKBESTOS PNR 600 VOLT CONTROL CABLE

For New Work or Rewiring...

PNR — Polyethylene • Nylon • Rockhide (PVC)

HERE'S THE PROOF WHEN IT COMES TO CONDUIT FILL

No. 12 A.W.G. (19/25) COND. SIZE.		1 CABLE PER CONDUIT				2 CABLES PER CONDUIT				3 CABLES PER CONDUIT				4 CABLES PER CONDUIT			
		Max. Cable Dia." Table 11 N.E.C.	Number of Conductors in one Cable ROCK PNR	3/64"	4/64"	Max. Cable Dia." Table 11 N.E.C.	Number of Conductors in one Cable ROCK PNR	3/64"	4/64"	Max. Cable Dia." Table 11 N.E.C.	Number of Conductors in one Cable ROCK PNR	3/64"	4/64"	Max. Cable Dia." Table 11 N.E.C.	Number of Conductors in one Cable ROCK PNR	3/64"	4/64"
½"	New Work	.450	2-4			.243				.234				.195			
	Rewiring	.479	2-4			.276				.252				.218			
¾"	New Work	.598	5-7	2-3		.323				.311				.260			
	Rewiring	.636	5-8	2-4	2	.367				.335				.290			
1"	New Work	.762	8-14	4-7	2-4	.412	2-3			.396	2						
	Rewiring	.811	8-16	5-8	3-5	.468	2-4			.427	2-3						
1¼"	New Work	1.000	15-19	8-12	5-8	.543	4-5	2-3		.523	3-5	2-3					
	Rewiring	1.070	17-19	9-16	6-9	.618	5-8	2-4		.564	4-5	2-3					
1½"	New Work	1.170		13-19	9-12	.634	6-8	4	2	.610	6-7	4					
	Rewiring	1.248			10-14	.721	9-11	5-7	2-4	.658	6-8	4-5	2				

This is an excerpt from the Rockbestos Control Cable Conduit Fill Chart covering sizes A. W. G. 9, 12, 14. Write today for your free copy. Ask for PNR 1-58.

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS • ATLANTA • DALLAS
SEATTLE • LOS ANGELES • BURLINGAME, CALIFORNIA

ROCKBESTOS

PNR Small Diameter Control Cable

MORE THAN 16,000,000 FEET IN SERVICE

50,000/66,667 Kva Pennsylvania LTC Transformer at Aurora Station Serves Taconite Mines and Processing Plants Near Duluth

Minnesota Power and Light Chose PENNSYLVANIA

Located at Minnesota Power and Light Company's Aurora Steam Electric Station near Duluth, the 50,000 66,667-kva Pennsylvania Load Tap Changing Autotransformer pictured is meeting all requirements under two extreme operating conditions. They are: widely varying load conditions peculiar to the nearby mines and processing plants of the taconite industry, and wide variations in temperature and weather that are characteristic of this northern state.

By means of 138-kv transmission lines, the transformer ties in the utility's 88,000-kw Aurora Steam Electric Station with the mining company's 150,000-kw Taconite Harbor Steam Electric Station. It feeds into the 115-kv and 44-kv transmission network of the Minnesota Power and Light Company system.

Compensating for load variations are two full-capacity taps in the high voltage and, in the low voltage, LTC equipment for ±10% regulation in 32 steps of ⅝%. The LTC is designed for future paralleling.

Whether your own transformer requirements include operating extremes or normal conditions, it will pay you to take advantage of Pennsylvania's power-transformer experience. Contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

McGRAW-EDISON

PENNSYLVANIA TRANSFORMERS

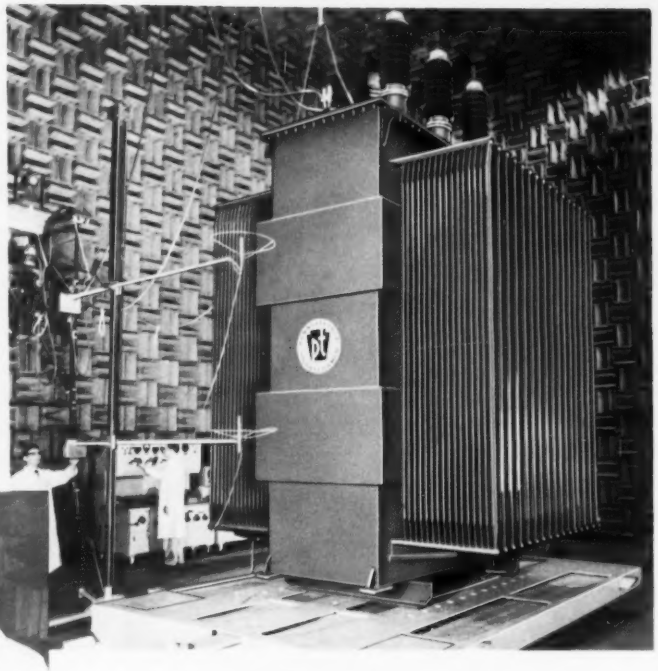
PENNSYLVANIA POWER TRANSFORMERS

See next page for some facts on facilities

PENNSYLVANIA...

HAS THE FACILITIES AND THE CAPABILITY TO MEET THE LARGEST POWER TRANSFORMER REQUIREMENTS

- A large, expertly-staffed engineering department with long experience in power transformer design—both core form and shell form.
- The ability to design and construct scale models for proving design characteristics.
- A modernly equipped plant capable of producing and testing the highest rated units contemplated by industry today.
- Handling and loading facilities that permit full utilization of manufacturing, shipping and installation economies.



PENNSYLVANIA'S NEW THOMAS A. EDISON ACOUSTICAL RESEARCH LABORATORY

Located in a seven-acre area adjacent to Pennsylvania Transformer's Canonsburg plant, this super-quiet structure has complete facilities for testing and analyzing transformer noises. Vibrations are "plotted" so that the sources of noise can be pinpointed. This permits corrective measures in current production and also points the way to more effective design. In the photographs, acoustical measurements are being taken on a 10,000-kva transformer. Transformers even larger than 100,000 kva, in certain voltage classes, can be tested in the new laboratory.

McGRAW-EDISON

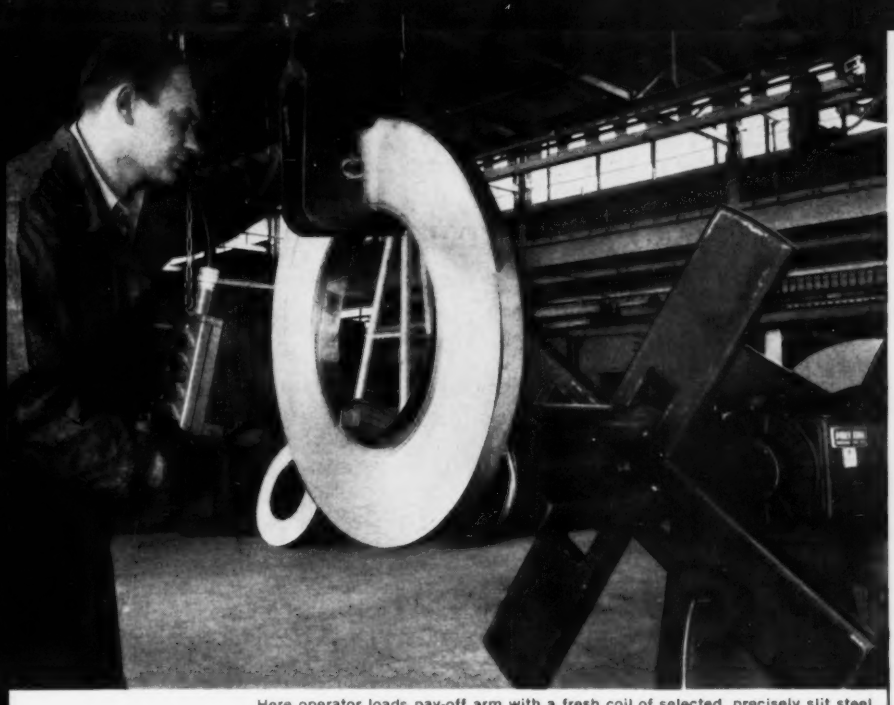
PENNSYLVANIA TRANSFORMERS

PENNSYLVANIA TRANSFORMER DIVISION

McGraw-Edison Company

CANONSBURG, PENNSYLVANIA Greater Pittsburgh District

See other side for story of power transformer ruggedness



Here operator loads pay-off arm with a fresh coil of selected, precisely slit steel.

easier-working CIRTUBE* EMT begins right here with the finest steel!

All the care in the world can't make the kind of EMT contractors like working with – unless the steel's right in the first place.

New CIRTUBE EMT is made with the right kind of steel: specially selected, cold rolled, uniform in quality – and with just the right amount of carbon content for ideal working qualities.

But the right steel isn't enough – proper processing is needed, too. Circle's modern processes are designed to keep in the natural bendability of the high grade steels it selects to make CIRTUBE EMT. Result: tubing that can take it with just the right amount of workability.

Proper steel is only one of many reasons why new CIRTUBE EMT helps get faster, better looking wiring jobs.

Next time you order, try new CIRTUBE EMT – you'll like working with it. Now at your Circle wholesaler's.

*Trade Mark

CIRCLE WIRE & CABLE
a subsidiary of
CERRO DE PASCO CORPORATION

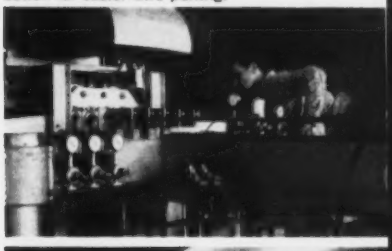
PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** In all principal cities

RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

CIRTUBE EMT *Ask for it!*

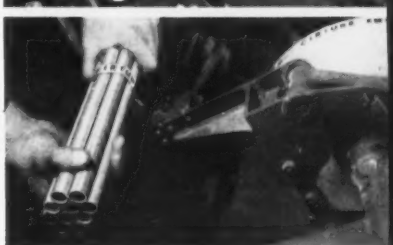
Split-free, bead-free! Induction welded CIRTUBE EMT, left, proves stronger than ordinary EMT, provides easier fishing.

Easy fishing! A baked-on protective coating gives CIRTUBE EMT a built in lubrication for easier wire pulling.



Lifetime exterior finish! Hard galvanized finish for durability; polished satin lustre for lasting good looks.

Automated quality control! Automatic controls assure complete and continuing uniform quality of product.



Tight, easily handled bundles! Bright, orange tapes hold CIRTUBE EMT securely for easy handling on and off the job.

Fast, friendly service! Well-known Circle service through a nation-wide network of well stocked nearby warehouses.

There Is No Magic Formula for Producing Substations, as Southern States Has Found from 910 Installations

As much as we like the idea of standardization, the one thing we have learned is that there is no cut-and-dried, assembly-line, easy way to produce substations.

We've been at it 28 years, producing more than 900 substations of all kinds, and it has always been tough for us!

Even stations with essentially the same assignments have endless arrangements. Infinite combinations of design preclude standardization. Each station must be virtually a custom-made project.

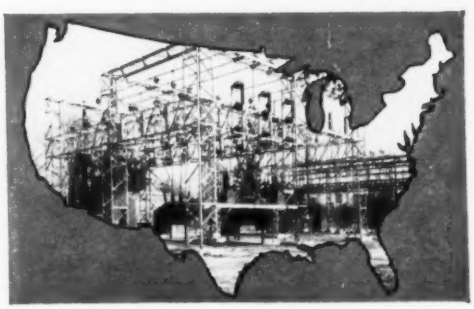
True, hundreds of designs in our files are helpful. Many standard components are picked up and used, with ultimate savings to our customers. And the practical experience of our design staff guides us around many pitfalls.

But you can't escape the fact that supplying substations requires these basic functions: skillful engineering, careful detailing, precise coordination of production schedules, and delivery on time. At least, that's what we've learned. And that's how Southern States approaches every substation assignment.

On this basis, you might like to do business with us. We'll welcome your inquiry. Just call your Southern States representative or write direct to us.

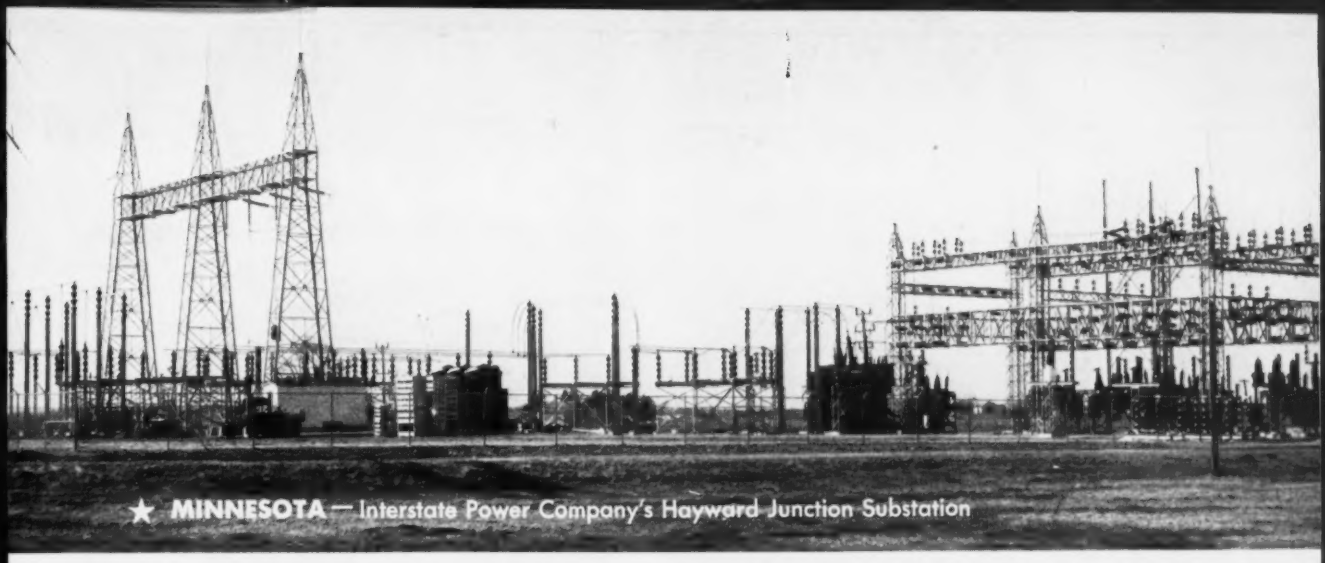
SOUTHERN STATES SUBSTATIONS ARE IN USE ALL OVER THE NATION

During the past 28 years Southern States has produced 910 outdoor substations for hundreds of different customers. The stations range from small 5,000 kva units to switchyards exceeding 1,000,000 kva. Regardless of size, Southern States pays close attention to every detail—from the single-line wiring diagram to the finished station.



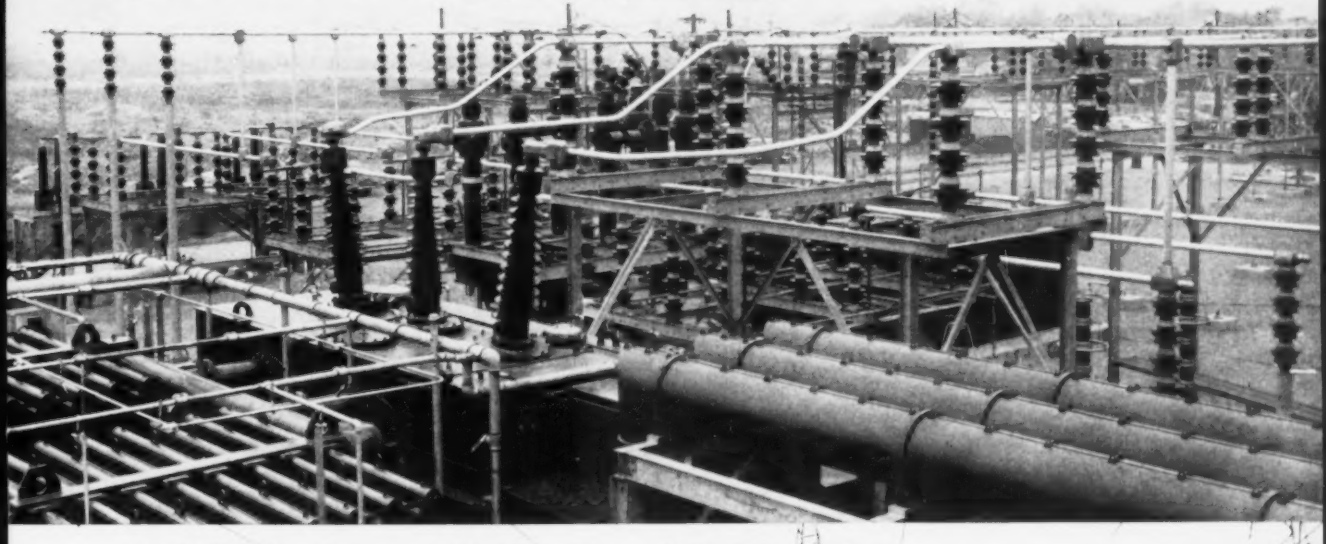
SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

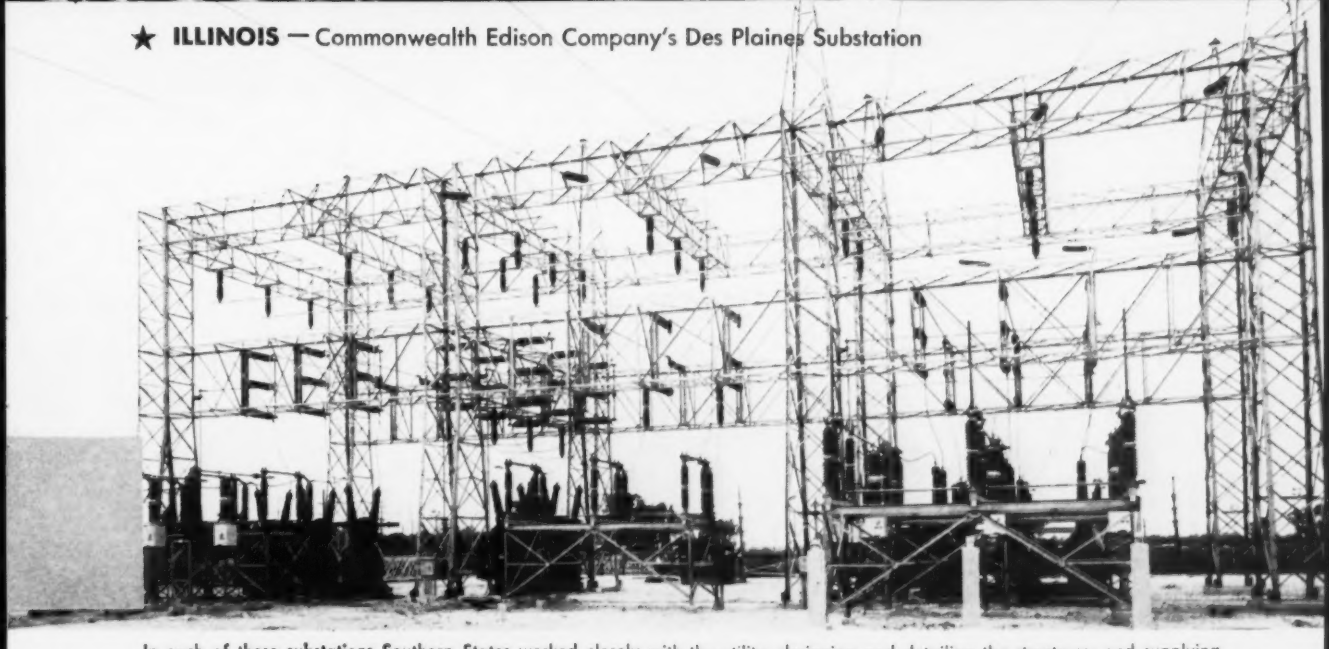


★ **MINNESOTA** — Interstate Power Company's Hayward Junction Substation

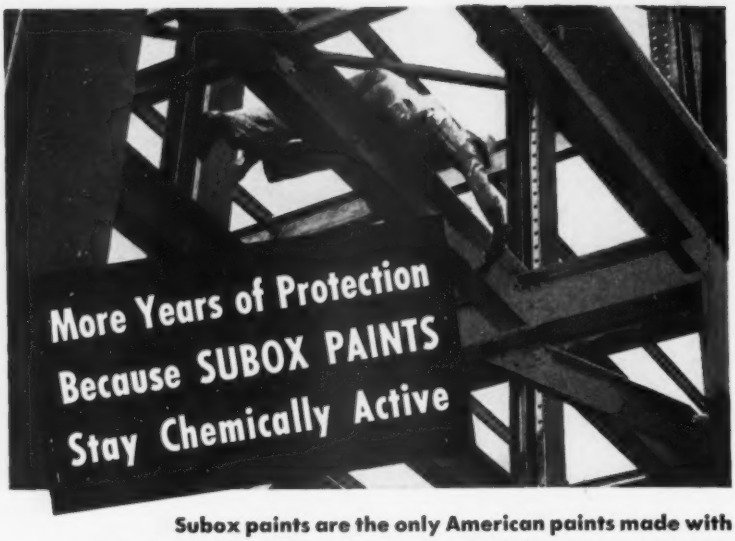
★ **NEW YORK** — Consolidated Edison's Corona Substation



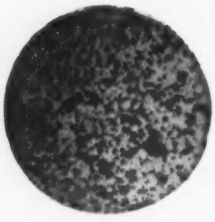
★ **ILLINOIS** — Commonwealth Edison Company's Des Plaines Substation



In each of these substations Southern States worked closely with the utility, designing and detailing the structures; and supplying many components, including structural steel, air break switches, disconnects, buses, cable conductors, connectors, and bus supports.

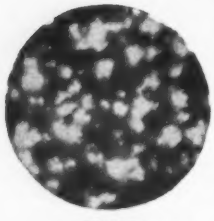


Subox paints are the only American paints made with lead-suboxide. They give extra protection at no extra cost.



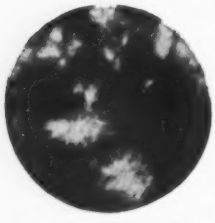
SMALL PARTICLES PENETRATE SURFACE

Maximum penetration is achieved because lead-suboxide is a colloidal pigment. Its film is so dense and impervious that two coats of Subox usually equal three coats of other paints . . . often one coat of Subox is sufficient.



CHEMICALLY-ACTIVE METALLIC FILM

Lead-suboxide remains chemically active after Subox paint dries. It reacts with the fatty acids of the vehicle to form insoluble lead soaps, and builds up a reinforced protective film of intertwining metal-bearing fibers.



FIBROUS COAT IS STRONG ADHESIVE

The fibrous film of Subox gradually strengthens and replaces the original vehicle film (which otherwise would become brittle), and creates a strongly adhesive protective coating with an inherently longer life than that of other paints.

Dark areas in above photomicrographs show how pigment increasingly intertwines to form dense, protective film.

In addition to its other advantages and economies, Subox also saves on eventual repainting. The need for expensive scraping and repriming is largely eliminated.

Available in wide color range. Write for color card and the brochure "Subox Paints".

SUBOX PAINTS

Subox Inc.

Established 1924

18 Fairmount Plant
Hackensack, N. J.

LETTERS TO THE EDITOR

Not True

To the Editor:

This letter is intended to clarify a situation concerning the wiring of our office building at 639 S. Spring St., Los Angeles, for individual room air conditioning units, which was described in an article on p 71 of your October issue of ELECTRICAL WEST, titled "Old Steam Pipes Bring Power."

This article states: "Power from the 1,000-amp unit was taken to the fourteenth (top) floor and then distributed down through the steam pipes."

Also: "The one limitation imposed by the use of the steam pipes as raceway," etc.

The above phrasing is not a true statement of fact and may have caused a misunderstanding by certain persons who have read this interesting article. If such is the case, we wish to state that the article should have read as follows:

"Additional installation economies were achieved by carrying the new 1,000-amp power supply to the air shaft over the top floor and distributing it to the various pilasters throughout the entire building, which had formerly contained the steam lines. By utilizing the *sleeves* which had contained the idle steam lines, as raceways for the 230-v power supply lines, the cost and inconvenience of running this new conduit and wiring through new floor openings was completely eliminated, resulting in the major installation saving."

In no instances was wiring installed in steam pipes. The steam pipes were removed from the sleeves and only the sleeves were used for raceways.

Warren E. Dyer
Building Manager
National Automobile & Casualty Ins. Co

Clever and Accurate

To the Editor:

I am laid up in U. S. Veterans Administration Sepulveda, Calif., Hospital for the repair of an injury to my back while pushing a partially loaded market basket just four months ago. Will be here all of four or more weeks.

Beth just brought my copy of ELECTRICAL WEST for December. Just to prove I *always* read the issues very thoroughly, I noted your very clever and accurate tuck-away of my incident with the serviceman in Electra. I wondered what had become of it. Thanks. Good job.

Teddy Bear
Panorama City, Calif.

Likes Management Series

To the Editor:

I would like to commend you on the fine series of articles which have been appearing in ELECTRICAL WEST under the name of "Problems of Management" by Dr. Joseph G. Phelan. These articles have a great deal to offer in the field of management. . .

D. E. Grover
Substation Department
Public Service Co. of Colorado
Denver

BIDS ALWAYS "ON THE NOSE" WITH UNIVERSAL LIGHTING DUCT

Exclusive BullDog features mean faster, easier installation that keeps costs competitive

Nothing makes it harder to figure lighting bids (particularly pipe and wire) than those unexpected—and expensive—changes you always run into after the job is started.

BullDog 20-amp Universal Lighting Duct licks that problem completely. You know in advance your final material and labor costs. So you can figure estimates—and profits—right "on the nose" before the job begins, instead of after it's over.

Changes in lighting arrangements during installation present no problem since you can tap in anywhere along the entire length of Universal Lighting Duct. Moving outlet locations, or rearranging the layout, can be done without costly and time-consuming rewiring. With BullDog, you just move the exclusive "twist-out" plug to the desired new location in a matter of seconds.

ULD is actually less expensive to install than pipe and wire, too, because it offers so many time-saving features . . . such as prefabricated parts . . . easily joined sections . . . choice of five installation methods . . . and the fact that it both feeds and supports the fixtures, thus eliminating the need for extra supports.

Join the growing list of contractors making money — and keeping customers happy — with ULD. For details, write BullDog Electric Products Co., Detroit 32, Michigan. © BEPCO

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

Consult the following Pacific Coast representatives:

Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7712
Portland 12, Oregon

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

Safety Switchboard Company
910-89th Avenue
Oakland 21, California

BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California

ELECTRA'S HUSBAND

Smog's Cause—Somebody Else

IT was one of those wintry days when mists come up out of the ground to lay an icy blanket over the Bay Area. Also arising from the earth were a variety of old odors buried there. In the sunshine these must steam away for they are seldom apparent. Yet with the earth mists they too arise.

Years ago this natural enough occurrence would have been shrugged off as "ground fog." Its smells would have been endured as one of those unfortunate things.

"Oh, I wish they'd do something about this smog," complained Electra.

"Just who are 'they'?" I asked. "Who should do something – and what?"

"Well surely they can stop all these factories stinking up the air with their old smoke stacks," she said.

"And put all the people who run them out of work? I don't think they would like that very well, smog or no smog," I countered.

"There you go getting technical. All I want is to get a little fresh air. These smells are awful. They sting my eyes. I just think somebody should *do* something. All they do is talk."

"Hardly," I answered. "A lot *is* being done. These very industries you mention are probably doing the most about it. They are big targets. Everybody blames them instead of examining what they themselves are contributing to it.

"These industries are trying, but it is not easy. It is very expensive too. I happen to know that the electric generating plants are burning all the gas they can get rather than fuel oil but the public gets first call on gas for cooking and house heating. And by the way, that activity contributes a lot to the air pollution too.

"I can remember when the whole town was trying to get smokestacks because they meant industries and jobs and prosperity. Once we have them locate here we forget how important they are in providing all of us with the good living we enjoy out here.

"But even if they closed down altogether there would still be smog." Of course that could not be accepted without challenge.

"Ah, come now," said Electra, "don't tell me any such thing. What would make smog?"

"Well there'd still be the ground or ocean fog. We cannot stop that. Yet it is what all of us put into the fog that makes smog out of it. And none of us are very willing to do our own bit of smog controlling."

"Just what do you imply?" Electra demanded.

"Well, suppose we start with ourselves. Everyone likes to blame something or somebody else, naturally, but suppose we face it. What do we do that contributes to air pollution?"

"All right, smarty, what do we?"

"We both smoke, to begin with."

"Now, come on. A little cigarette once in awhile doesn't make much smoke," she protested.

"Have you ever been to a meeting where everybody smoked? The air gets thick enough with smoke to cut with a knife. True, one little cigarette, dear, is not much. But stop to think of the millions of cigarettes bought every day. And who wants to give them up? Even the scare of lung cancer doesn't stop but a very few.

"Then there are automobiles. Who wants to give up or even curtail the use of his or her car?" I went on.

"I was reading just the other day that the scientists have come up with a device that will decrease the smog-producing effect of the auto exhaust by 80%. The catch is it costs about $100. I'd like to hear you scream if the city fathers passed a law making it necessary to plunk out that much in order to drive to the garden club."

"Well, no, but surely they can do something about that, those clever engineers in Detroit," she hedged.

"*They*, again! It is not that easy and it won't be done tomorrow—or very cheaply. The only really hopeful thing I have heard along that line is that electric cars can be made to give satisfactory operation. There is a plant in San Diego that says it will build several thousand for the market this year. They will not give off fumes.

"We've let our electric street cars and trolley buses go broke. They used to carry people around without making smog. Once there was a fine network of electric railways that made no smog. True enough the old coal-smoking locomotive is gone but it is succeeded by a more refined smog producer, the diesel train and trucks. And the aircraft that are giving trains a bad time pour out tons of products of combustion into the atmosphere. Nobody wants to give up air travel.

"Then around home here we all like to barbecue burgers outdoors and the more smoke the tastier. We like to burn up all that rubbish that collects so surprisingly every day too. Now the gas companies are even bringing back gas lights for the garden, and they contribute too."

"You admitted a minute ago," parried Electra, "that the electric power stations do their share, burning oil and gas. I'm astonished that you would admit your old electricity did anything wrong."

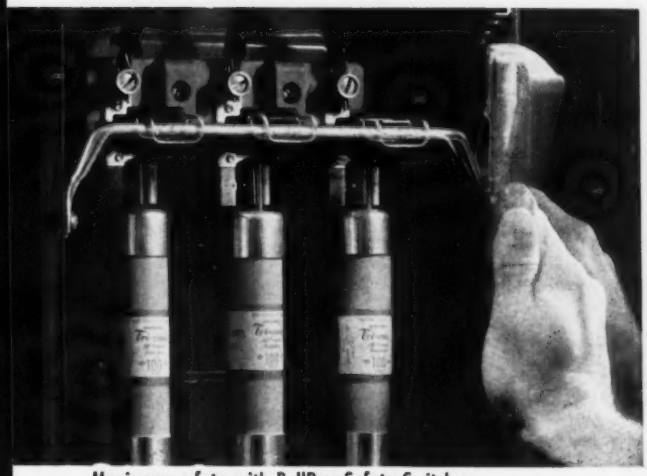
"Electricity is clean, as I always say. Why even if we could replace all the other forms of motive power by electricity, the way the electric utilities carefully control their furnaces and clean up the smoke by electric precipitation and other means, that would be by far the best utilization of the fuel resources of the world. We can control a few big plants in the way they burn their gas and oil but it is hopeless to try to control you and me and millions like us in all of our wasteful individualistic ways."

"Well," Electra had the last word, "you can give up that smelly old barbecue. It was your idea, not mine. But I won't quit smoking until they do something about those old factories – yes, including your generating plants."

You can't win!

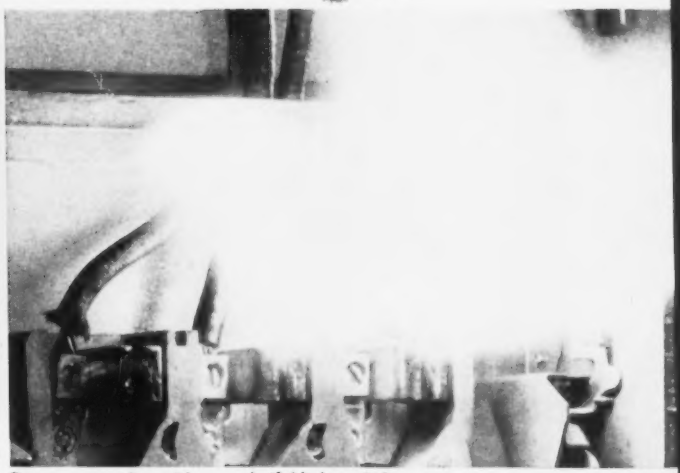
FOR SAFETY'S SAKE, BUY VACU-BREAK

With BullDog's exclusive clamped-pressure switching contacts



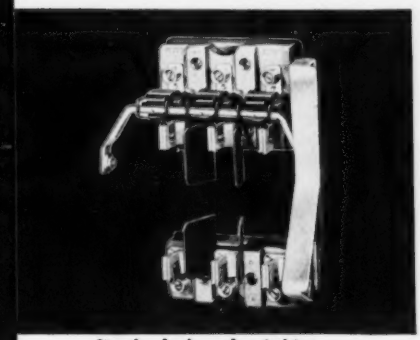
Maximum safety with BullDog Safety Switches

Arcs are smothered before they can cause fire hazard or damage to the switch because contacts are housed inside compact Vacu-Break* chambers. Pitting and burning of contacts are reduced to an absolute minimum—maintenance is virtually eliminated.



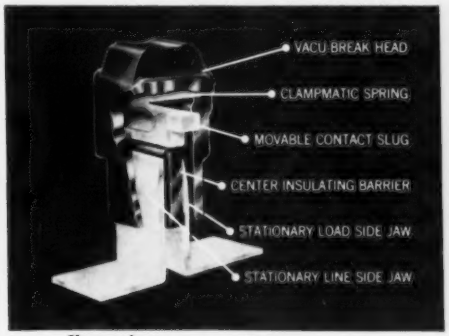
Dangerous arcing with open knifeblade switches

Unconfined flash explosion occurs, burning and pitting blades. Fire hazard and frequent maintenance are the result. These are unretouched photographs of 100 amp, 600 volt switches, operating under 90 ampere, 440 volt load with 40% to 50% power factor.



Simple, foolproof switching

Vacu-Break heads are *directly* connected to the switch handle. No toggles, triggers or springs to fail. No danger of switching failure. Positive, safe switching *every time* for a lifetime.



Clamped-pressure contacts

This close-up shows movable contact slug and Clampmatic* spring assembly inside Vacu-Break chamber. The Clampmatic assembly assures clamped-pressure contacts, speeds "break", increases switch life.

Withstand 100,000 amp fault current

BullDog Vacu-Break Switches—Master and Junior—will withstand 100,000 amp short circuit current when equipped with current-limiting Amp-Traps**. Play it safe—recommend and buy BullDog Vacu-Break!

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*Vacu-Break and Clampmatic are registered trademarks of the BullDog Electric Products Company. **Amp-Trap is a registered trademark of the Chase-Shawmut Company.

BULLDOG

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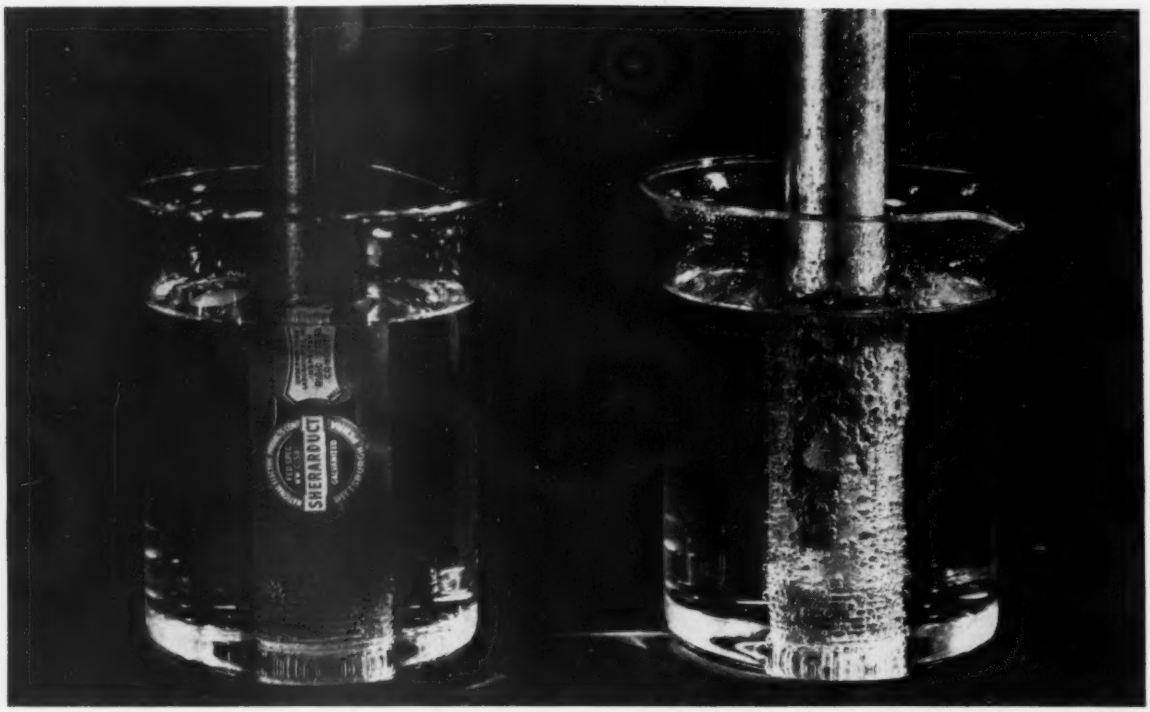

Many tests are made to compare various conduits under different exposure conditions. One of the most severe is the sulfuric acid test. Immerged into a 7½% solution of sulfuric acid, the zinc protection on ordinary brands of conduit fails in less than 6 hours, while the MVC-1 coating on SHERARDUCT stands up for 72 hours and longer. Other accelerated tests—salt spray, caustic soda, etc.—do not affect the MVC-1 polyvinyl coating.

HOT ZINC COATED

SHERARDUCT with MVC-1

provides permanent protection of electrical wiring

Even under the most severe service conditions, hot zinc coated SHERARDUCT with MVC-1 gives lifetime protection of wiring. MVC-1—the baked-on polyvinyl chloride resin coating—is an exclusive National Electric development. It resists all types of corrosion. On top of the hot zinc coating of SHERARDUCT, MVC-1 adds years to the service life of your conduit system . . . even in extreme service exposure conditions.

In addition to its exceptionally high corrosion resistant properties, MVC-1 is exceptionally resistant to abrasion, and it is not adversely affected by high or low temperatures. Once installed, hot zinc coated SHERARDUCT with MVC-1 is there to stay.

SHERARDUCT also gives you time-saving and money-saving benefits on the job. The slow heating-cooling "normalizing" process gives SHERARDUCT easy-to-bend properties, easy to cut and re-thread in the field—no cracking, no flaking of the finish. Besides, the smooth inside surface of the polyvinyl coating makes fishing easier and faster . . . provides protection against corrosion for the interior of SHERARDUCT.

Added together, these benefits mean hot zinc coated SHERARDUCT with MVC-1 provides top money value . . . in ease of installation . . . in years of protection. Why take less, when with SHERARDUCT you get the best. VMA-6303

National Electric Products Corp.

In Canada: NEPCO of Canada, Ltd.

PITTSBURGH 22, PENNSYLVANIA

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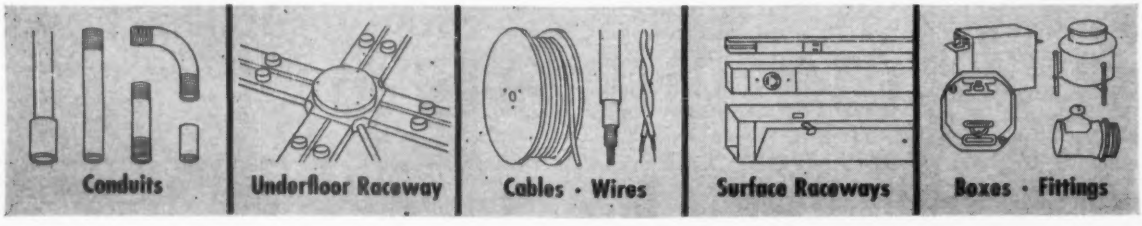
The NEPCO quality family provides dependable, permanent, maintenance-free electrical systems



CONCENTRATED

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Los Angeles 23, California

Runner for one of seven Francis turbines being built by B-L-H's Eddystone Division for Niagara Power.

Seven B-L-H turbines to produce 1,400,000 hp at Niagara

Baldwin-Lima-Hamilton's Eddystone Division is again tackling a really big turbine job. It is building seven Francis-type turbines—the mightiest hydraulic turbines ever made in the United States—for the main generating plant of the Niagara Power Project, now under development by the Power Authority of the State of New York. Each of these behemoths is rated at 200,000 hp when operated for best efficiency at 120 rpm under 300-ft. head. The huge plant, a 2,000,000 kilowatt installation designed to serve western New York, Pennsylvania and Ohio, is scheduled to go into operation in 1961.

Hundreds of the most efficient hydroelectric plants throughout the world owe their success to B-L-H's 130 years' experience in designing and building hydraulic turbine equipment. In addition to all four basic types of turbines—impulse, Kaplan, Francis and propeller—B-L-H also manufactures governors, surge suppressors, valves, special pumps, and other accessory equipment. For more information and a free copy of our *new illustrated Turbine Bulletin 1002*, write to Eddystone Division (B-L-H), Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth Street, San Francisco 10, Calif.

BALDWIN · LIMA · HAMILTON
Eddystone Division
Philadelphia 42, Pa.

Hydraulic turbines • Weldments • Dump cars • Nonferrous castings • Special machinery • Bending rolls • Machine tools

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CONCENTRATED
STRESSES
CAUSED

BY
VISE-LIKE
CLAMPS
MEAN
LINE FAILURE!

Comprehensive new folio tells how and why AGS* eliminates line failures.

Send for your copy:

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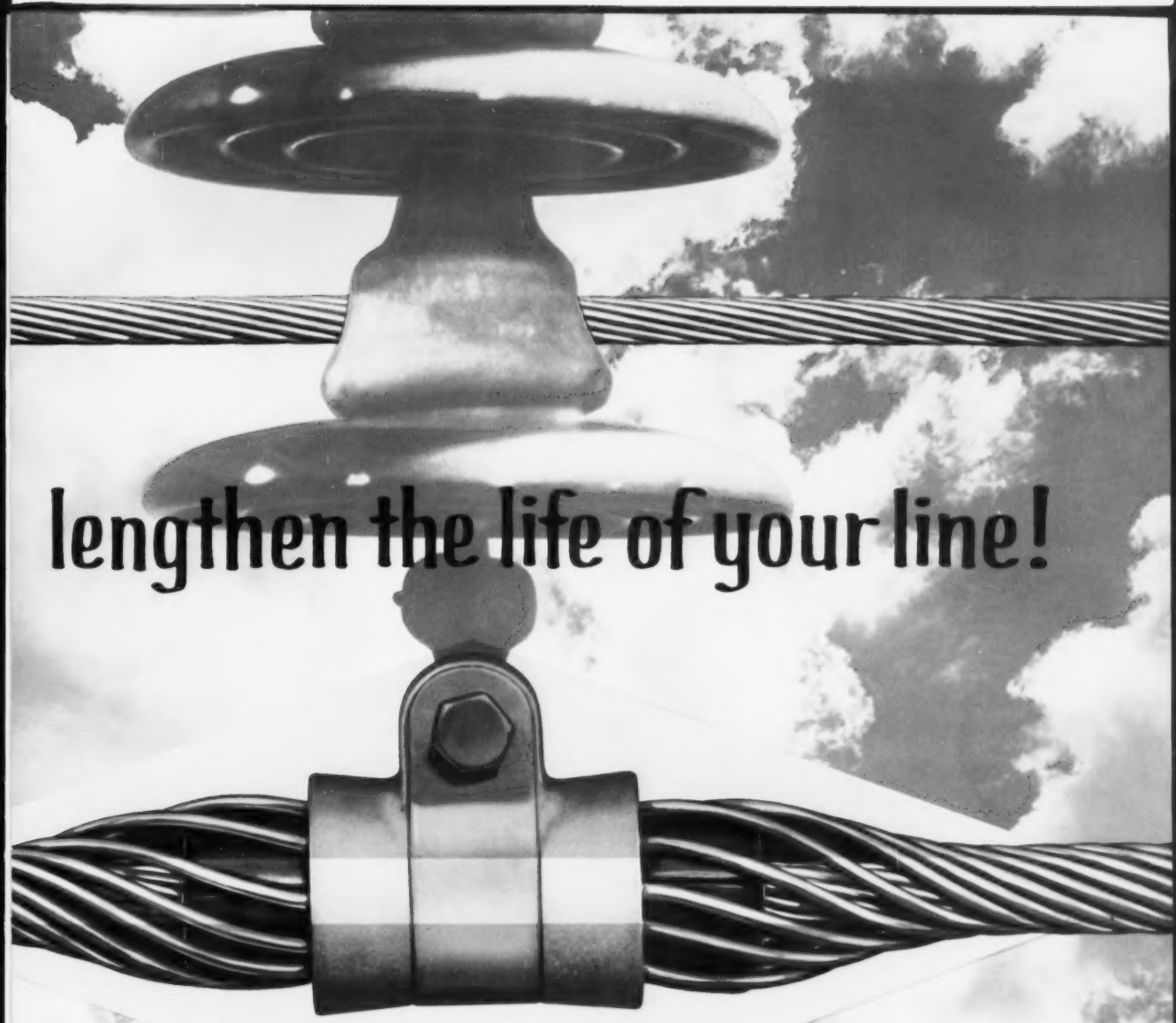


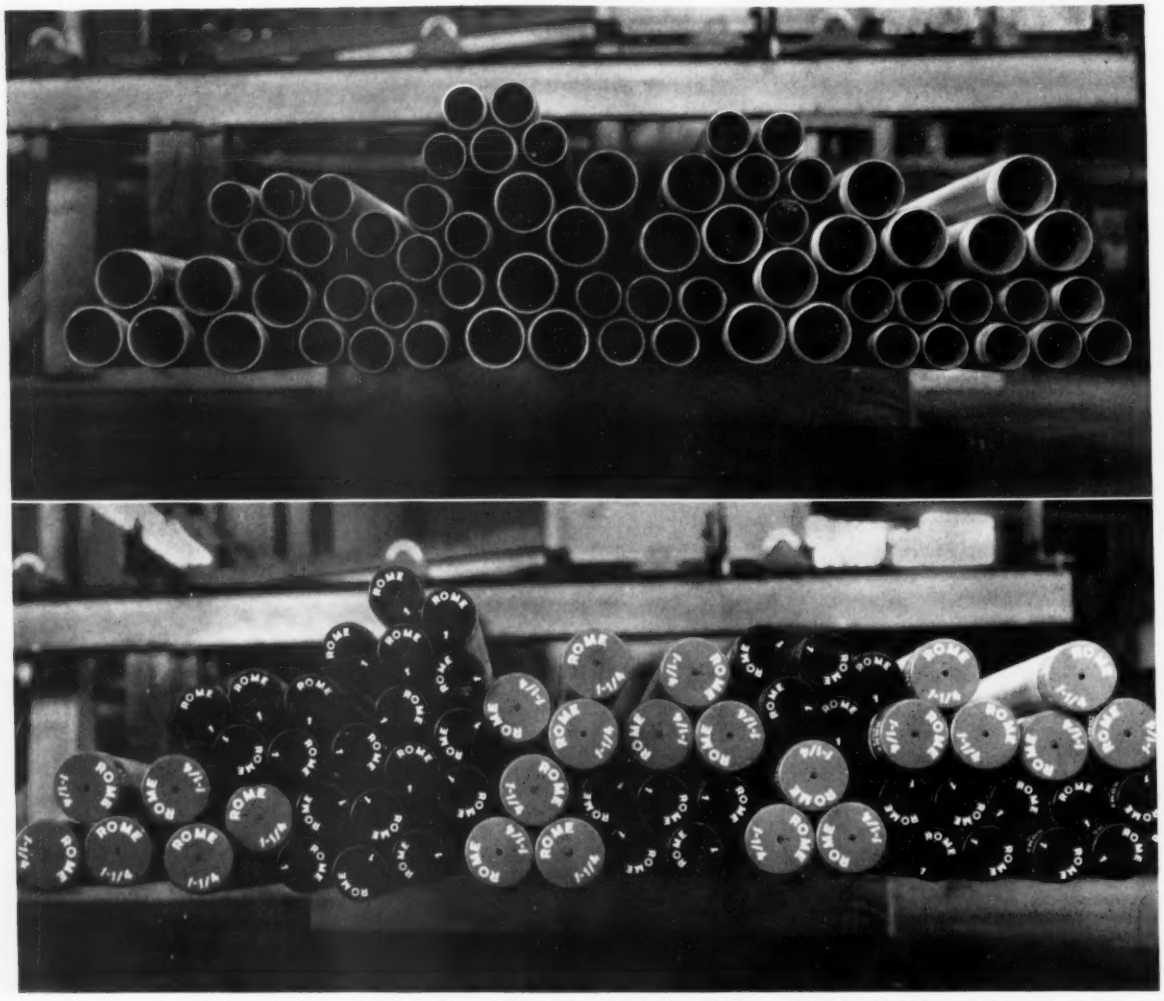
lengthen the life of your line!

eliminate failures by dispersing stresses over a wide area with...

AGS* Preformed Armor-Grip* Suspension

You can look up to **Preformed***

Trade mark* Patented — U. S. Patent No. 2,722,393



• Blue . . . 1", 2", 3", 4", 5", 6" • Black . . . ½", 1½", 2½", 3½" • Red . . . ¾", 1¼".

Which conduit stack would you prefer for easy size identification?

There's no need for your crews to spend a lot of time searching through stacks of rigid conduit for a particular size. Now they can see the size they need *from thirty feet away.*

With Rome's rigid conduit you can cut on-job costs by eliminating waste motion. This conduit is equipped with unique steel thread protectors that are color-coded and lithographed with the conduit size for easy and immediate identification.

Rome's rigid conduit with color-coded, size-imprinted thread protectors also saves you money by:

Eliminating capping time

Your crews need not search for seals or bushings to protect your conduit from concrete, dirt or stones. You simply bend a stub-up with Rome's color-coded thread protector in place and then leave it.

Positive thread protection

Rome's color-coded thread protectors are made of *steel* to prevent damage to the threads. They fit firmly on the conduit, yet are easily removed without damaging either the threads or the protector itself. You can use them over and over again.

Make your work easier—and save money, too. Use Rome's rigid conduit for your next job. Call your Rome Cable distributor for more information —or write to Department 948, Rome Cable Corporation, Torrance, Calif.

ROME CABLE
CORPORATION

Trade mark* Patented — U. S. Patent No. 2,722,393

ELECTRICAL WEST

VOL. 122, NO. 2
FEBRUARY 1959

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Despite adding over 3,000,000 kw of capacity and experiencing a decreased rate of load growth in 1958, Western power suppliers voice confidence in the future, plan to spend . . .

Another Billion in 1959

The 12 Western states are increasing in population at twice the rate of the 37 Eastern states. These Westerners, now representing 14% of the nation's population, are making ready for a million newcomers a year by placing 19% of the engineering construction contracts and building up a backlog of 25% of the nation's construction program. Here in the West also, this 14% segment of the population is building nearly 25% of the new homes and now using 20% of the nation's power.

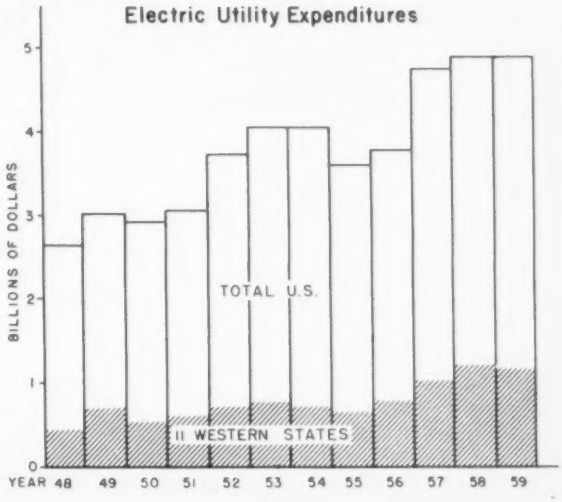
By Western standards, 1958 load growth was disappointing, being only at a rate of 1.3% for a total net generation of just under 123 billion kwh. This compares to over 120 billion kwh in 1957 and 58 billion kwh back in 1949. Paradoxically, this dip in the growth curve came at a time when Western utilities were having far and away their biggest year for increased generation capabilities.

The planners are looking ahead with optimism for they have budgeted another billion-dollar year for utility construction, the second time that projected expenditures have reached that figure. According to the comprehensive survey conducted at the year's end by ELECTRICAL WEST, the actual expenditures for 1958 by the power suppliers of the West totaled $1,049,000,000.

The accompanying chart of Western capacity additions (next page) shows the boom-or-bust nature of the annual generation additions. Utility budgets, however, fail to reflect this widely fluctuating curve of capacity additions. If the money does not go for penstocks, boilers and generators, it has to be spent for transmission and distribution improvements with the result that Western utility budgets continue to reach upward year after year with only minor ups and downs.

Utility construction only paces the capital expansion of other areas in the West. For example, housing starts per year have moved along at a relatively steady pace, varying from 310,000 in 1955 to 260,000 in 1957 with the projected figure for 1959 being about 280,000 new dwelling units (see p. 64).

Western industrial expansion also grows apace, with the manufacturing industry matching dollar for dollar the expenditures in power supply facilities. Western industry plans to spend over a billion dollars in 1959 for new facilities and modernization. In addition to this, the mining, petroleum and all other utilities will spend over $1 billion. Commercial establishments such as buildings, stores, etc., contribute an additional $1,600,000,000 (see p. 64). Thus, the over-all construction program in this dynamic region will reach nearly $6 billion or 19.2% of the nation's total.



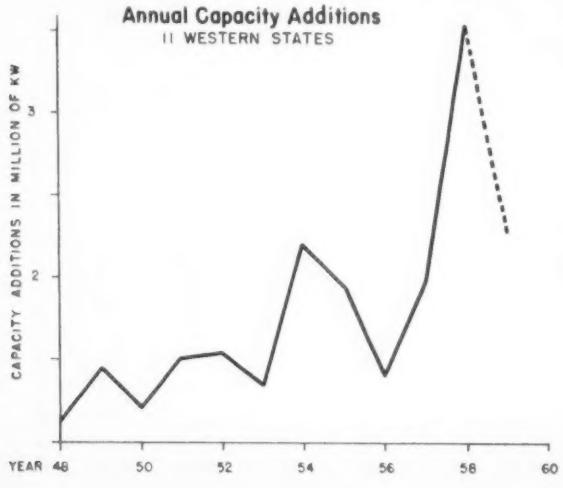
The Utility Outlook

At this time last year ELECTRICAL WEST predicted that the electric utility construction expenditures in the 11 Western states would be $1,128,000,000. Based on year-end reports, actual expenditures total $1,042,000,000, indicating that little—if any—construction was postponed by the recession. From the same survey it was determined that utility expenditures projected for 1959 will be just over $1 billion, or almost exactly equal to the actual expenditures of last year.

Generation

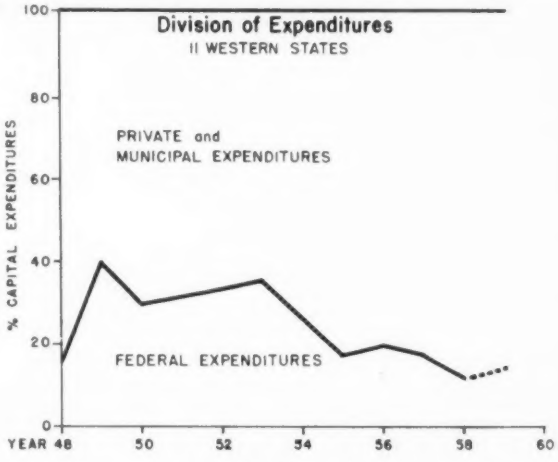
1958 was the all-time record year for putting new generating capacity on the line. The total capability of the 11 Western states was increased by 3,400,000 kw, of which 2,200,000 kw was in hydro stations. In 1959 the total new capacity expected to come on the line will be just under 2 million kw, with 1,050,000 of that in hydroelectric capacity.

There are important trends discernible in this area. While there are still large projects yet to be developed on the Columbia and the Colorado, the importance of falling water as an energy source is gradually declining because of economics. Conversely, utility management is much preoccupied with the procurement of economical fuel supplies. Nuclear generation already is a factor in Western generation planning, although its full impact probably will not be felt until 1965. A vast new supply of gas for the Northwest and northern California areas will be tapped when the new pipeline from western Alberta to the San Francisco Bay area is completed. Coal, too, is making a bid with the completion of Pacific Power & Light's Dave Johnston coal-fired plant at Glenrock, Wyo., which now will be doubled in capacity. Utah Power & Light is planning a large coal-fired station in southwestern Wyoming and even in the Northwest, the engineering reports on the feasibility of a large coal-fired station in the Cle Elum field was reported favorably. 1959 likewise will see the tapping of geothermal fuel resources of the northern California geysers, Pacific Gas and Electric Co. having announced the construction of the first such plant in the U.S.



Transmission

Moving away from the generation scene, 1959 will see the addition of 2,120 miles of new transmission line, and the addition of 3,920,000 kva of new transmission substation capacity. This figure is down somewhat from last year's addition of 2,445 line miles of transmission and 5,505,000 kva of new substation capacity. Last year's additions, of course, were necessary to link the new generating capacity with the system and therefore represent an understandable peak.



Distribution

On the distribution side of the system, addition of distribution line miles for 1959 will be up to 6,660 miles, a slight increase over last year's actual addition of 6,260 miles. Distribution substation capacity is up to 2,450,000 kva of new capacity, an increase over last year's performance of 2,300,000 kva of distribution substation capacity.

British Columbia

In keeping with the policy set last year, the figures stated to date do not include expenditures in British Columbia, which in 1959 will approximate $100,000,000 in electric utility expenditures. The following tabulations showing the capability and production performance of the 11 Western states are taken from Federal Power Commission and EEI figures, which include only the 11 Western states and therefore do not include British Columbia, Alaska or Hawaii.

Federal Expenditures

Federal expenditures for 1959 show a slight percentage increase over 1958. The accompanying chart shows the trend of federal expenditures from a high of 40% of total in 1949 to 1958's low of nearly 11%.

STATISTICAL REVUE —1958

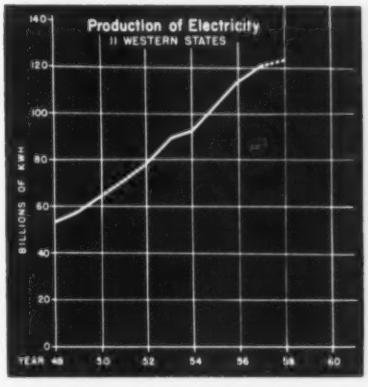
Comparison of Western to National Operations for 1957 and 1958

	11 Western States		United States		% West to U. S.
	1957	1958*	1957	1958*	1958
Energy generated (thousands of mwh)	120,631	**122,796**	631,380	**641,000**	**19.2**
Energy generated hydro (thousands of mwh)	76,131	**82,084**	130,140	**143,000**	**57.4**
Energy generated fuel (thousands of mwh)	44,500	**40,712**	501,240	**498,000**	**8.2**
Per cent hydro to total	63.1%	**66.9%**	20.6%	**22.3%**	
Total installed capacity (mw)	24,045	**27,574**	128,737	**142,700**	**19.3**
Hydro capacity (mw)	13,836	**16,118**	26,951	**29,891**	**54.0**
Fuel capacity (mw)	10,209	**11,456**	101,786	**112,809**	**10.2**
Number of customers	8,485,925	**8,757,035**	55,171,089	**56,242,400**	**15.6**

* Electrical West projections based on EEI and FPC figures through Nov. 1958.

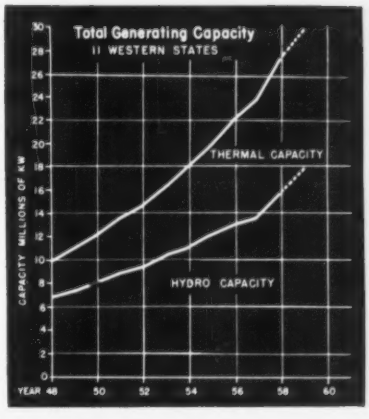
Generation Record by States
(in thousands of mwh)

	1949	1954	1957	1958	% West. States
Arizona	3,434	5,406	6,637	**7,736**	6.3
California	22,112	37,749	49,760	**50,811**	41.3
Colorado	1,630	3,518	4,175	**4,373**	3.6
Idaho	1,840	3,925	4,672	**4,948**	4.0
Montana	2,915	4,272	5,215	**4,559**	3.7
Nevada	3,591	1,978	2,322	**2,800**	2.3
New Mexico	910	1,603	2,321	**2,589**	2.1
Oregon	5,291	9,046	13,683	**13,368**	10.9
Utah	614	1,731	2,843	**2,770**	2.3
Washington	15,079	23,019	27,895	**27,828**	22.7
Wyoming	506	606	1,018	**1,014**	0.8
Total	57,922	92,853	120,631	**122,796**	100.0



Generation Capacity by States, 1958
(Generator Capacity in Megawatts)

	Water Power	Thermal Power	Total Capacity	% Western Capability
Arizona	980	928	1,908	6.9
California	3,691	7,608	11,299	41.0
Colorado	248	854	1,102	4.1
Idaho	1,412	4	1,416	5.1
Montana	911	118	1,029	3.7
Nevada	587	116	703	2.5
New Mexico	25	662	687	2.5
Oregon	3,045	204	3,249	11.8
Utah	99	526	625	2.3
Washington	4,953	243	5,196	18.8
Wyoming	167	193	360	1.3
11 Western States	16,118	11,456	27,574	100.0



Calender of Generation

1959—Fuel Generation Planned

Agency	Plant	Size—Kw
B. C. Electric *	Port Mann	100,000
B. C. Power Comm. *	Georgia	23,040
Burbank PS Dept.	Olive Ave. No. 1	44,000
Calif. Elec. Power	Yuma Axis	80,000
Glendale PS Dept.	Glendale	44,000
Hawaiian Electric	Waiau	50,000
L. A. Dept. of W&P	Scattergood No. 2	156,250
PS of Colorado	Cherokee	110,000
So. Calif. Edison	Mandalay Nos. 1 & 2	440,000
	Total	**1,047,290**

1959—Hydro Generation Planned

Agency	Plant	Size—Kw
Army Eng.—Portland	The Dalles	312,000
B. C. Electric	Bridge River No. 2, Units 1 & 2	124,000
B. C. Power Comm.	Ash	25,200
Cowlitz County PUD	Swift No. 2, Unit 1	35,000
Grant County PUD	Priest Rapids	394,250
Puget Sound P&L	Upper Baker River	94,000
USBR, Colorado	Big Thompson	4,500
USBR, Oregon	Green Springs	16,000
Washington Water Power	Noxon Rapids Nos. 1 & 2	200,000
	Total	**1,204,950**
	Total for 1959	**2,252,240**

1960—Fuel Generation Planned

Agency	Plant	Size—Kw
Arizona PS	Ocotillo, Units 1 & 2	220,000
Hilo Electric	Waiakea No. 5	15,000
Pacific P&L	Dave Johnston No. 2	100,000
PG and E	Pittsburg No. 5	325,000
PG and E **	The Geysers	12,500
PS of Colorado	Cameo	44,000
PS of New Mexico	Reeves	49,000
San Diego G&E	South Bay No. 1	136,500
Tucson GEL&P	Tucson No. 4	75,000
	Total	**977,000**

1960—Hydro Generation Planned

Agency	Plant	Size—Kw
Army Eng.—Portland	The Dalles	312,000
B. C. Electric	Bridge River No. 2, Units 3 & 4	124,000
Calgary Power	Rundle	30,000
Calgary Power	Spray	50,000
Chelan County PUD	Rocky Reach	202,800
City of San Francisco	Cherry Project	135,000
Eugene W&E Board	Carmen-Smith	56,000
Grant County PUD	Priest Rapids	394,250
Idaho Power	Oxbow	190,000
Ketchikan PU	Beaver Falls	4,000
Puget Sound P&L	Lower Baker River	64,000
Sacramento MUD	Jaybird No. 1	67,000
Seattle City Light	Gorge	57,000
So. Calif. Edison	Mammoth Pool	150,000
USBR, Wyoming	Fremont Canyon	48,000
Washington Water Power	Noxon Rapids Nos. 3 & 4	200,000
	Total	**2,084,050**
	Total for 1960	**3,061,050**

1961—Fuel Generation Planned

Agency	Plant	Size—Kw
B. C. Electric	Burrard	157,500
Calif. Elec. Power	Cool Water	64,500
Colo. Springs PU Dept.	South Plant	33,000
PG and E	Pittsburg No. 6	325,000
Salt River Power	(Unnamed)	156,000
So. Calif. Edison	Huntington Beach Nos. 3 & 4	440,000
So. Nevada Power	Clark	66,000
	Total	**1,242,000**

1961—Hydro Generation Planned

Agency	Plant	Size—Kw
Army Eng.—Portland	Hills Creek	30,000
Army Eng.—Portland	Cougar	25,000
Army Eng.—Missouri River	Fort Peck	80,000
Army Eng.—Walla Walla	Ice Harbor	270,000
Chelan County PUD	Rocky Reach	405,600
Tacoma City Light	Mayfield	120,000
USBR, Colorado	Upper Molina	8,400
USBR, Colorado	Lower Molina	4,600
	Total	**943,600**
	Total for 1961	**2,185,600**

1962—Fuel Generation Planned

Agency	Plant	Size—Kw
Arizona PS	San Juan Project	172,000
Burbank PS Dept.	Olive Ave. No. 2	44,000
Calgary Power	Wabamun	150,000
Glendale PS Dept.	Glendale	44,000
Hawaiian Electric	Waiau	50,000
Ketchikan PU	Herring Cove	1,500
L. A. Dept. of W&P	Haynes No. 1	200,000
Maui Electric ***	Lahaina	5,000
Pasadena L&P Dept.	(Unnamed)	60,000
PG and E ****	Humboldt Bay No. 3	60,000
PS of Colorado	Cherokee	150,000
PS of New Mexico	Reeves	70,000
	Total	**1,006,500**

1962—Hydro Generation Planned

Agency	Plant	Size—Kw
Chelan County PUD	Rocky Reach	101,400
Montana Power	Thompson Falls Addn.	35,000
PG and E	Kings River	42,000
Sacramento MUD	Camino No. 1	43,000
Sacramento MUD	Union Valley	30,000
Tacoma City Light	Mayfield	40,000
	Total	**291,400**
	Total for 1962	**1,297,900**

1963—Fuel Generation Planned

Agency	Plant	Size—Kw
Arizona PS	San Juan Project	172,000
Kittitas PUD	Cle Elum	250,000
L. A. Dept. of W&P	Haynes No. 2	200,000
PS of Colorado	Denver Area	150,000
So. Colorado Power	Pueblo	22,000
Utah P&L	Kemmerer No. 1	150,000
	Total	**944,000**

1963—Hydro Generation Planned

Agency	Plant	Size—Kw
Sacramento MUD	Jaybird No. 2	67,000
USBR, Utah	Flaming Gorge Nos. 1, 2 & 3	108,000
	Total	**175,000**
	Total for 1963	**1,119,000**

1964—Fuel Generation Planned

Agency	Plant	Size—Kw
Arizona PS	San Juan Project	172,000
Hilo Electric	Waiakea No. 6	15,000
PS of New Mexico	Reeves	70,000
	Total	**257,000**

1964—Hydro Generation Planned

Agency	Plant	Size—Kw
Grant County PUD	Wanapum	600,000
Portland GE	Round Butte	300,000
Sacramento MUD	Camino No. 2	43,000
Tacoma City Light	Mossyrock	150,000
USBR, Arizona	Glen Canyon	450,000
USBR, Montana	Yellowtail	100,000
	Total	**1,643,000**
	Total for 1964	**1,900,000**
	Grand Total '59 thru '64	**11,815,790**

* Gas Turbine
** Geothermal
*** Diesel
**** Nuclear

What Drives the Economy?

There's an answer to this question—people and power. A Stanford Research Institute projection of Western population indicates that in the period from 1959 to 1975 Western population will soar from 24 million to 39 million people, an addition of nearly 15 million people to the West. This growth rate of 54% is more than twice the projection predicted for the balance of the U. S. Westerners live better. They have a higher per capita income, $1,820 vs $1,610 for the balance of the U. S. They use more power, 1,420 kwh vs 1,130 kwh per capital for the 37 eastern states.

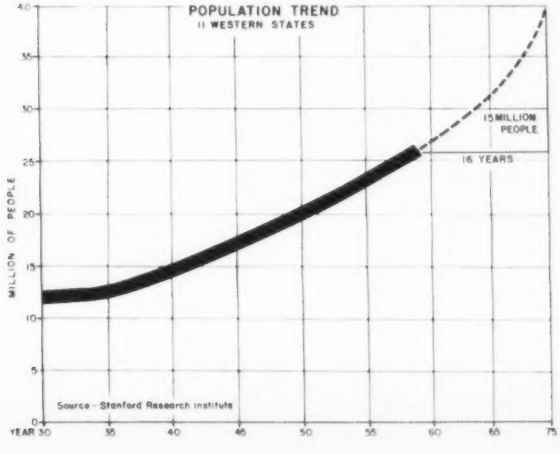
These facts reflect themselves in the utility operations.

	11 Western States	Balance of U. S.
Installed capacity per capita	.99 kw	.71 kw
Investment per kw added 1950 to 1957	$394	$357
System investment per customer	$910	$774
Miles of transmission per 1,000 customers	8.5	5.5
Line transformer capacity per customer	3.4 kva	2.7 kva

The pressure of population growth spurs construction of all types. Facilities for handling traffic, water supply and sewage disposal, pollution of air, streams and even the Pacific Ocean, institutional facilities such as hospitals, houses of correction, etc., and a host of similar service-type matters must not only be planned for but financed. Not the least of these will be provisions for the 3,000,000 additional children of school age who will enter the population pattern in the next 16 years.

That Westerners are not unmindful of these responsibilities is indicated by the fact that this 11 Western states region, with 40% of the land area of the country but only 14% of the population, is contributing close to one-quarter of the total construction budget of the country.

Most people using more power to live better—what will it mean by, say, 1975? Drawing on the best projections available, we can put some dimensions on the next 16 years' growth.



Targets for 1975

- Home building equal to three cities the present size of Los Angeles, at a cost of $100 billion.
- A market for goods and services equal to the entire state of California as it is today.
- The addition of electric power facilities equal to 15 systems the present day size of Pacific Gas and Electric Co.
- 1,700 new elementary schools, 300 new high schools, 10 new colleges.
- An investment of $35 billion in manufacturing plants and equipment.

Nonutility Construction

All the bellweathers of industrial growth indicate an upswing for the West. 18.6% of the engineering construction contracts are in the West. 24.9% of the backlog of proposed construction is in the West. 25% of the building permit activities are in the West, and a like percentage of the housing starts. All this for 14% of the country's population. The accompanying tabulations show how the Western industries will split up the $5.8 billion industrial expenditure in 1959. These figures are based on a recent study by the McGraw-Hill Economics Department.

Viewed in toto, 59% of this figure will go for new equipment and machinery in existing plants, and 41% will go for new structures and equipment.

While there appears to be plenty of business in prospect for consultants and contractors, costs for any kind of construction in 1959 are going to be higher.

Western Building Permit Activity—
(Valuation Millions of $)

	1954	1955	1956	1957	1958*
New dwelling units	2,451	2,846	2,458	2,330	2,250
Commercial buildings	216	406	510	464	530
Institutional buildings	367	360	484	514	610
Industrial buildings	117	174	377	240	205
Total all types†	3,839	4,426	4,584	4,345	4,960
Percentage of U. S.	23.3	23.5	24.4	24.1	24.9

† Including categories not listed above
* Based on first eight months
(Source U.S. Dept. of Commerce)

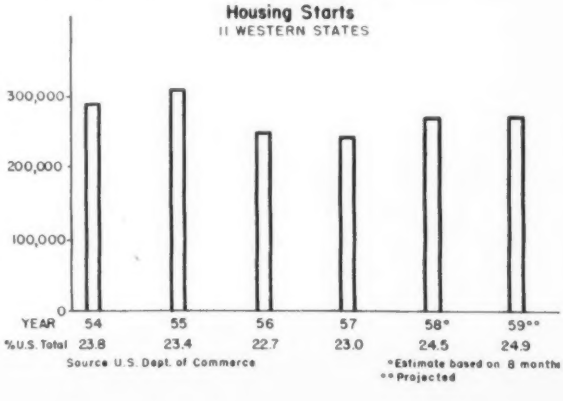
Three West Coast chapters of Associated General Contractors have concluded new three-year labor contracts with several of the building trades which were highlighted by a 50¢-per-hour package for carpenters in western Washington. The growing probability of a steel strike in July may be another headache in trying to keep jobs on schedule the last half of the year.

Labor demands in the fabricating end of the construction business will add to material prices which have been soaring steadily since 1949. The concurrent construction cost indexes calculated by *Engineering News-Record* hit a new high in January, up to 30 points over a year ago for construction costs and 20 points for building costs. While this represents a relatively modest percent increase for the year, it is up nearly 5% over the 1957 figure on construction costs and nearly 4% on building costs.

Anticipated Capital Spending by Business in the West
By Major Industry

Iron and steel	$134,000,000
Nonferrous	17,000,000
Machinery	67,000,000
Electrical machinery	6,000,000
Auto, truck and parts	13,000,000
Transportation equipment	95,000,000
Other metalworking	94,000,000
Chemicals	69,000,000
Lumber	98,000,000
Pulp and paper	88,000,000
Rubber	9,000,000
Stone, clay and glass	34,000,000
Food and beverages	206,000,000
Miscellaneous	164,000,000
All manufacturing	1,094,000,000
Mining	71,000,000
Petroleum industry	572,000,000
Railroads	161,000,000
All other utilities	2,300,000,000
Commercial establishments	1,600,000,000
All business	$5,798,000,000
% U. S.	19.2%

Based on McGraw-Hill Economics Department figures



Loadbuilding Prospects

There is considerable interest in the performance of utilization devices such as electric appliances. Nationally, NEMA estimates point to a 7% increase in appliance sales for 1958. Individual manufacturers place their estimates at 8%, and in many cases higher. *Electrical Merchandising* predicts a 10% increase over 1958, or very close to the all time 1955-56 peaks. Two other indicators seem to predict a good year for appliances. First, inventories are in balance; and second, there are indications that 1959's disposable income will be at an all-time record high.

While the national picture is rosy, the prevailing fact of Western population growth will be felt in increased appliance sales. With 25% of the housing starts in the West, it seems very logical that a like percentage of major appliances will find their way into these homes.

In a recent survey by *Electrical Merchandising* of the number of appliance sales per thousand customers in '58, the Pacific area was ahead of the United States figure on everything but air conditioners; the Mountain region in every category except air conditioners and vacuum cleaners. In the table are some figures showing how the West stacked up with the U.S. as a whole.

1958 Appliance Sales Per Thousand Customers

	Pacific States	Mountain States	Alaska	Hawaii	British Columbia	U.S.
Washer-dryer combinations	7	6	3	3	3	5
Waste disposers	17	16	4	10	3	9
Dishwashers	14	12	2	8	3	10
TV	116	116	9	98	85	107
Washers	83	89	10	109	37	70
Dryers	30	31	8	10	18	22
Ranges	33	41	9	44	35	29
Refrigerators	73	66	9	86	52	63
Water heaters	18	16	15	52	23	15

Residential Consumption

Another indication that Western appliance sales will continue upward is the fact that the increase in the use of residential kilowatt-hours didn't show the sharp break in 1958 common to the total Western use of kilowatt-hours (see chart).

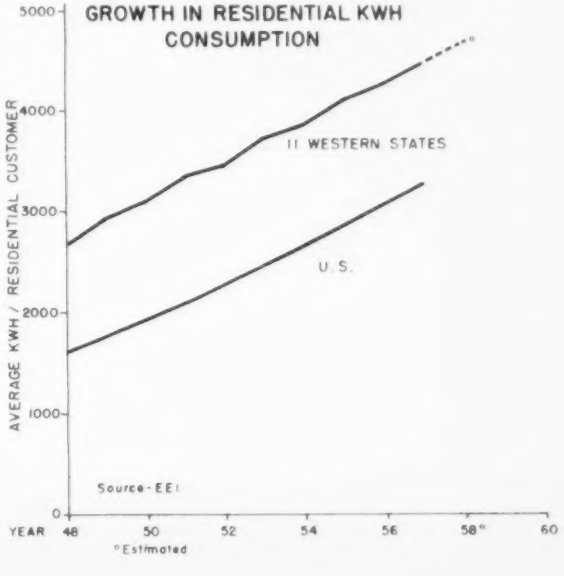
Utility load building programs will be backed up by promotion budgets averaging close to $2.15 per meter, it was shown in an ELECTRICAL WEST survey of firms serving some 93% of the West's electrical customers and representing private and public agencies.

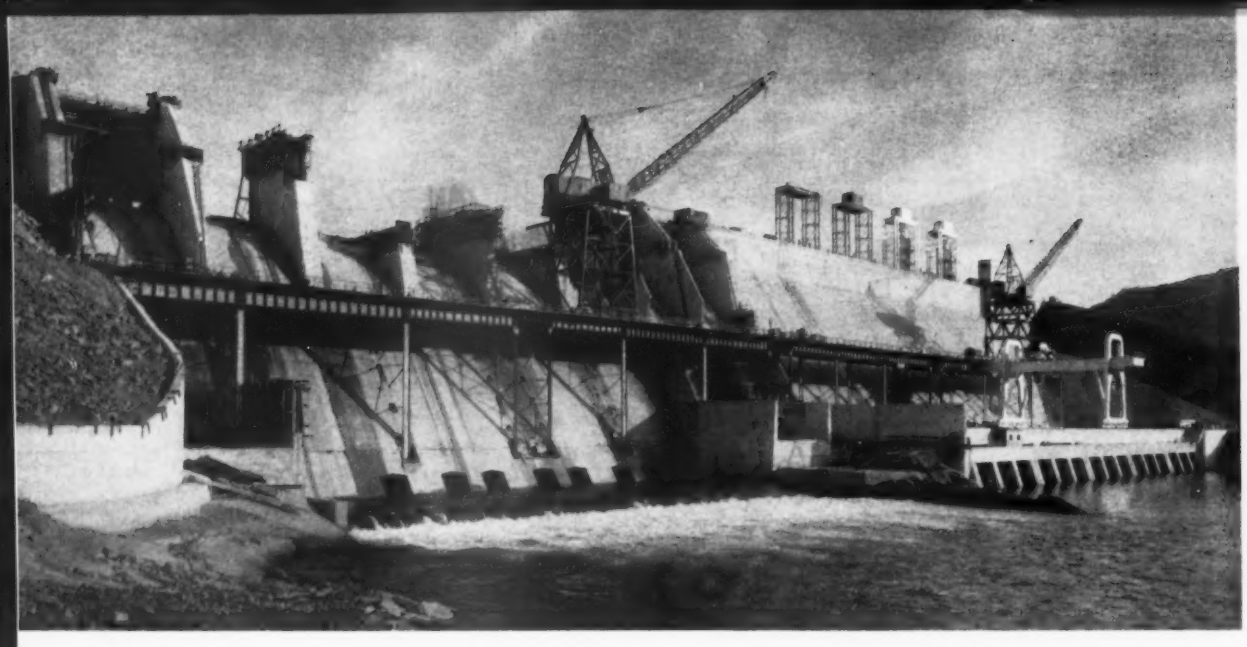
A representative group of nine firms serving some 3,259,168 customers will increase its spending in 1959 $1,198,398 over '58. Total '59 budget of this group is $7,931,300.

Looking beyond the appliance scene, NEMA estimates for 1959 are broken down as follows:

	Increase in 1959
Appliances	7%
Illuminating equipment	6%
Signal and communication	1%
Industrial apparatus	7%
Building equipment	8%
Insulating materials	11%
Insulated wire and cable	8%
Generation, T&D	2%
Other electrical products	9%
Total	7%

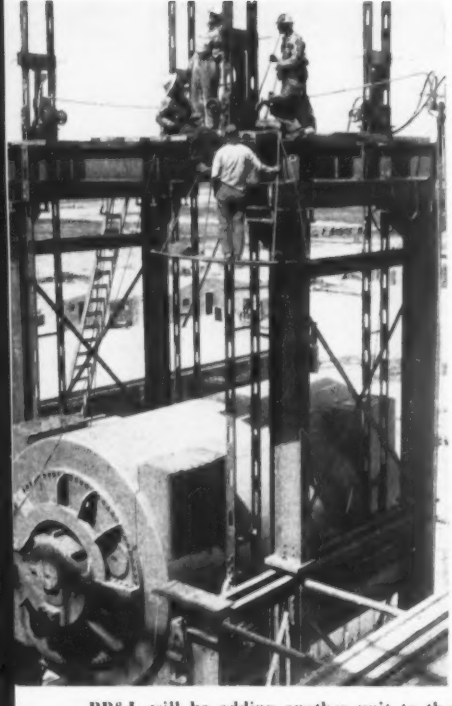
One Western manufacturer's representative summed up the industry's attitude toward 1959 with the simple statement: "I think it'll be easier to get our expense accounts approved during 1959."





WWP's Noxon Rapids to go on the line in '59 symbolizes continued high level of utility construction. Here, Western . . .

Executives Report on 1959



PP&L will be adding another unit to the Dave Johnston plant in 1960

ARIZONA—Utility Spending Up $9 Million in '59
System Peaks Up 10-30%

Arizona Public Service

Review of '58

Customers	160,435
Power sales	2,484,869 mwh
System peak	549 mw
Capacity	391 mw
Construction	$28,000,000

The electrical construction expenditures for 1959 are estimated at $34,000,000. More than 50% of the 1959 construction expenditures will be allocated for additional generation capacity. Two 110,000-kw steam units are under construction at Ocotillo power plant, located east of Tempe, Ariz. These units are scheduled for completion in early 1960. The initial 80,000-kw unit at the Yuma Axis power plant, being installed by California Electric Power Co. and operated by Arizona Public Service Co., is scheduled for completion in 1959. Engineering studies are being made for the first coal-fired power plant on the system.

The transmission lines mileage to be added during 1959 include a 40-mile 230-kv line from Leupp to Dilkon to serve an El Paso Natural Gas Co. compressor station; 19 miles of 69-kv line from Gila Bend substation to Dendora substation; 29 miles of 69-kv line in the Phoenix area; and expansion of the transmission and distribution system on the Navajo Indian Reservation.

Eight new substations will be placed in service in 1959, three of which were started in late 1958. Coconino substation will have a 25/33-mva 230/69/12.5-kv transformer; Eagle Eye substation a 15/20-mva 161/69/12.5-kv transformer; and Mural substation a 15/20-mva 115/69/12.5-kv transformer. Five new substations, a 12/16/20 mva, 230/4.16 kv, two 12/16 mva, 69/12.5 kv, a 7.5 mva, 69/12.5 kv and a 5.0 mva, 69/12.5 kv, will be constructed in 1959. The capacity of several other distribution substations will be enlarged to accommodate next summer's increased loads.

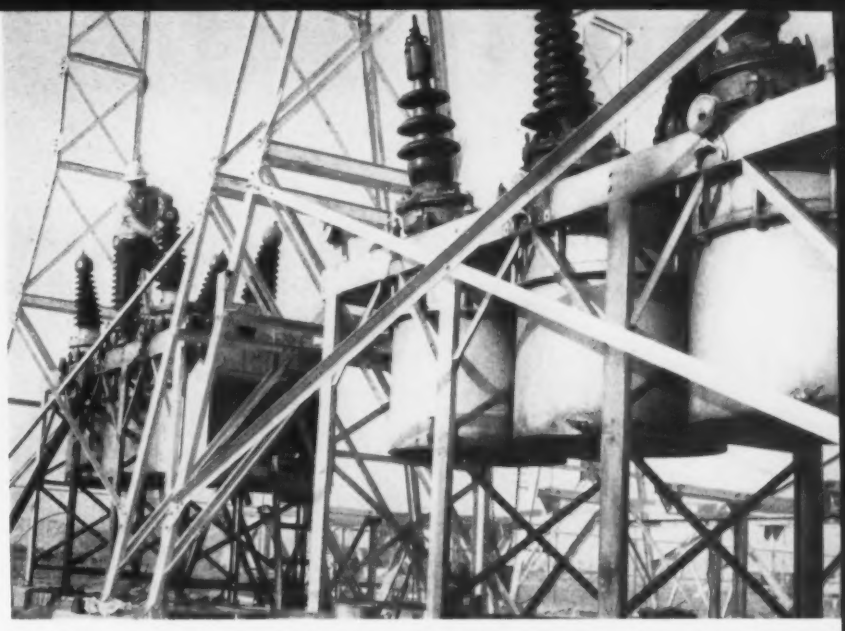
The peak load for 1959 is estimated at 625 mw.—**T. A. Phillips, vice-president in charge of engineering.**

Salt River Power District

Review of '58

Customers	67,500
Power sales	1,925,000 mwh
System peak	451 mw
Capacity	422 mw
Construction	$6,900,000

Scheduled construction expenditures for 1959 will amount to $7,600,000. Major construction will include four new 69/12-kv substations and two new 69/4-kv substations—also enlargement of two existing substations. Total transformer capacity involved will amount to 105,000 kva. Construction of 39 miles of 69-kv line and 130 miles of distribution line are anticipated for 1959. Other scheduled construction includes a reactor installation, connection of a spare exciter for the frequency changers, and rebuilding the oil circuit breakers at Mesa switching station, installation of capacitors at various points on the system, and the conversion of South Consolidated hydroelectric station to unattended operation—**T. M. Morong, chief engineer.**



Above, '59 will be a banner year for distribution substation construction. Right, Salt River Power's new Superior-to-Dinal line with older 25-cycle line in front

CALIFORNIA—Utilities Add 1,438,000 Kw Capacity During '58. Budgets Slide From 426 to 360 Million for '59

Burbank PS Dept.

Review of '58

Customers	36,800
Power sales	400,000 mwh
System peak	77.5 mw
Capacity	70 mw
Construction	$5,500,000

Work of construction of the 44,000-kw steam-electric generating unit at the Olive Avenue power plant and the 69-kv to 34.5-kv Valley receiving station progressed through 1958 with completion of each expected in the middle of 1959.

Completion of the Flower Street distributing station will occur early in 1959.

No major projects are planned for 1959 other than completion of projects currently under way. Work planned for the next fiscal year includes the installation of a second 69-kv to 34.5-kv system tie for connecting the Olive Avenue plant with the Burbank station and the Magnolia Boulevard plant, a second transformer bank at the Flower Street station, additional new feeders out of various distributing stations for relieving growing load on existing feeders, and the beginning of a primary distribution capacitor program.—**Alan E. Capon, assistant general manager and chief engineer.**

California Electric Power

Review of '58

Customers	102,000
Power sales	1,475,300 mwh
System peak	325 mw
Capacity	376 mw
Construction	$21,865,155

Major construction work carried out or in progress during 1958 included several large projects: (1) Completion of the second 62,500-kw generating unit at the San Bernardino steam plant; (2) construction progress on the first 80,000-kw generating unit at the Yuma Axis steam plant; (3) completion and occupancy of the new general office and general service center buildings in the first quarter of 1958.

Engineering and design work was continued on the first 64,500-kw generating unit at the Cool Water steam plant to be located near Daggett, Calif.

Active engineering and design work was carried on for a 1.6-mile section of 161-kv single-circuit line to deliver the output of the Yuma Axis steam plant. Construction work on this line will be carried out during 1959.

During 1959 the largest individual expenditures will relate to:

Work at the Yuma Axis steam plant to permit completion in the spring of 1959 and start of active construction work at the Cool Water steam plant late in 1959.

Work on hydroelectric generating plants will include conversion of one single-unit plant to remote-control operation; increase the storage of one main reservoir by 2,500 acre-ft; replacement of 8,100 ft of wood stave line; replacement of a water wheel at another plant; and miscellaneous improvements to electric auxiliaries and construction of and improvements to miscellaneous plant buildings.—**Willis T. Johnson, vice-president and assistant general manager.**

Geysers—A fascinating new source of energy for the West. PG and E will make pioneer development in 1960. Here engineers measure natural steam pressure

California-Pacific Utilities

Review of '58

Customers	35,600
Power sales	296,159 mwh
System peak	92 mw
Capacity	26 mw
Construction	$802,000

Perhaps in beginning we should discuss the merger of the Southern Utah Power Co. with our company, which was completed during June of 1958.

The Southern Utah Power Co. provided electric service to approximately 5,200 customers in a service area of 13 communities in southwestern Utah. The population of this area, now reported at approximately 23,000, is expected to fulfill all forecasts of further substantial growth with the expansion of the production of agricultural products in the extensively irrigated rich valleys of the region. The principal industry of this area is iron mining. Approximately 20,000 kw of generating capacity were added to our company's system with the addition of this service area, now known as our Southern Utah Division.

The company's 1959 construction budget in excess of two million dollars provides for an expenditure of slightly over a million dollars for additional facilities on our electric properties. The substantial increase in system load and the increased use of service by all classes of customers naturally will require the addition of a substantial amount of new substation and distribution system capacity.

May I mention that most of our service area in seven Western states continues to point toward the uninterrupted healthy rate of growth of our electric business as we have had during the past years. Numerous new housing projects are planned in many parts of our service area and the lumber industry on our various Oregon properties is expected to benefit with some expansion of their operations. We therefore look forward to another year of substantial growth in the company's business during 1959.—**E. K. Albert, president.**

Glendale PS Dept.

Review of '58

Customers	51,460
Power sales	261,100 mwh
System peak	64 mw
Capacity	60 mw
Construction	$2,760,700

The past year, 1958, saw considerable progress made on the construction of the No. 4 unit addition to the city's steam-electric power plant. It is fully anticipated that this 44-mw unit will go on the line Oct. 1 as planned. This addition will bring the city's generating capacity to 104 mw, not including 18 mw capacity from Hoover Dam.

The current 1958-59 fiscal year's budget for capital expenditures of $5,849,700 is approximately 112% above actual expenditures for the previous year. This large increase reflects primarily the major portion of the construction on the No. 4 unit addition to the city's steam power plant as well as the complete installation during the latter part of 1958 of an 8,000/9,200-kva distribution substation.

The routine budget program, of replacing older pole lines which have passed their economic life, in recent years has had to be subordinated to new construction to service additional and new customer loads. Addition of the new Fremont distribution substation in 1958 will make necessary the complete rearrangement of an older existing substation service area to serve new load from the released capacity.—**L. W. Grayson, general manager and chief engineer.**

Imperial Irrigation District

Review of '58

Customers	32,000
Power sales	586,000 mwh
System peak	145 mw
Capacity	173 mw
Construction	$1,200,000

Pilot Knob hydro plant, which was first operated in 1957, proved to be a very productive plant during 1958, generating over 90,000,000 kwh, or better than 32% of the year's total hydro generation.

While there were no major additions to plant in 1958, construction expenditures for the year were approximately $1,200,000. Included in new construction was 12 miles of subtransmission line to serve the rapidly developing resort areas on the west shore of the Salton Sea. $1,900,000 have been budgeted for additions and betterments to the system during 1959. It is expected that during 1959 the expanding load will require addition of 25,000 kva in transmission substation capacity and 10,000 kva in distribution transformers.—**G. E. Tank, general manager.**

Los Angeles Dept. of W&P

Review of '58

Customers	884,000
Power sales	6,140,620 mwh
System peak	1,435 mw
Capacity	1,850 mw
Construction	$60,700,000

The power system of the Department of Water & Power plans an expenditure program for 1959 of $57,630,000 to continue the high level of construction of new plant and expansion of existing facilities.

The first unit of the Scattergood steam plant was started up and synchronized with the system in December 1958. Construction on Unit 2 is progressing on schedule and should be ready for start-up by fall of 1959. Each of these units is rated at 156,250 kw. Ultimate capacity of this plant consisting of six units will be not less than 1,200,000 kw.

Design engineering is in progress for Haynes steam plant, Units 1 and 2, located just east of the San Gabriel River and north of the city of Seal Beach. Planned ultimate capacity is 1,400,000 kw and initial installation will be two 200,000-kw

units. The expected system peak for 1959 is about 1,555,000 kw.

The first circuit of 12.4 miles of 138-kv transmission line from Scattergood steam plant to Receiving Station D was completed in November 1958. Tower line work has been completed and underground cable work is in progress on the second circuit. The latter is scheduled for completion by March 1, 1959. These lines consist of 4.8 line miles of tower line and 7.6 line miles of underground lines.

Construction of new Receiving Station N was progressed during 1958 and will be energized by spring 1959. The initial installation will include two 60,000-kva power banks to provide for the rapidly increasing industrial load in the vicinity of the Los Angeles Airport.

Two new distributing stations scheduled to be completed in 1959, together with power bank changes in existing stations, will result in a total increase of 98,000 kva for 1959.

New distribution lines to be built in 1959 include 95 miles of pole line and 29 circuit miles of underground cable.—**Ivan L. Bateman, chief electrical engineer and assistant manager.**

Pacific Gas and Electric

Review of '58

Customers	1,851,000
Power sales	18,515,000 mwh
System peak	4,019 mw
Capacity	5,219 mw
Construction	$142,000,000

During the latter half of 1958 the Company placed in operation 685,500 kw of generating capacity, of which 470,500 kw were installed at hydro plants and 215,000 kw at thermal plants. These additions pushed the Company's total generating capacity to 5,219,000 kw and will meet growth in demand through 1959.

The hydro capacity added consisted of three installations on the Feather River and two on the Kings River. On the Feather: two units at the Poe Plant totaling 106 mw; two units at the Caribou Plant, 109 mw; and the single unit, 36 mw Butt Valley Plant. On the Kings: two units at the unique 500-ft underground Haas Plant totaling 128 mw; and two additional units at the existing Balch Plant, 91.5 mw. In connection with the generating capacity added on the Kings, Wishon and Courtright Dams also were completed in 1958 with respective storage capacities of 128,000 and 123,000 acre-ft. The cost of the plants on the Feather is estimated at $79,650,000 and the construction on the Kings to date at $66 million. These figures are exclusive of transmission facilities for the projects on both rivers and of the future Kings River Plant.

Thermal plants accounted for the remaining 215 mw of 1958 generating capacity. Unit No. 4 at Hunters Point Power Plant in San Francisco added 165 mw to raise the plant capacity to 427 mw. The estimated cost of this addition is $21 million. The other 50 mw of thermal capacity were placed in operation at Humboldt Bay Power Plant, near Eureka. This is the second 50-mw unit constructed at this location and is expected to cost about $7.2 million. Construction of Unit No. 5 at Pittsburg Power Plant, on Suisun Bay west of Pittsburg, started in December 1957, with operation scheduled for the Spring of 1960. The No. 6 unit is scheduled for start of construction in early 1959 and for operation in the Spring of 1961. Each of these units will add 325 mw to system capacity and will increase plant capacity to 1,310 mw, or double its present size. The cost of this additional 650 mw is estimated at $76.7 million, exclusive of transmission.

In early 1958 PG and E announced plans to construct a nuclear plant at the Humboldt Bay site, to be known as Unit No. 3. This significant development in the peacetime application of nuclear energy has been made possible due to advances in the design and technology of the boiling water reactor, based on knowledge gained in the successful operation of the Vallecitos Atomic Plant, and because of favorable factors at the proposed plant location. These two factors combine to achieve competitive power with the second uranium fuel core. It is expected that this goal will be approached with the first core. The unit will have an expected output of 60 mw. Completion is scheduled for mid-1962 at an estimated cost of $19.5 million.

A release made in December 1958 announced the application to the California Public Utilities Commission for authorization to construct a geothermal generating plant at The Geysers in Sonoma County. This plant, the first of its type in this country, will take delivery of steam from underground wells owned and developed by the Magma Power Co. and the Thermal Power Co. to drive a 12,500-kw turbogenerator unit. It is expected that construction will start in July of this year with completion scheduled for April 1960. The plant and related transmission are estimated to cost $2 million.

It is presently anticipated that the Kings River Plant to be located at the lower end of the Company's Kings River chain of reservoirs and plants will be operative in mid-1962. This plant is planned for 42 mw capacity at an estimated cost of $11.3 million.

During 1958 the Company added 1,164.7 mva of transmission and distribution substation transformer capacity to its system. This total includes 827.7 mva of step-up capacity at the seven generating plants listed above. During the current year an estimated 626 mva will be placed in operation.

The Company added 260 line miles of transmission (60 through 220 kv) and 820 line miles of distribution lines to its system during 1958. For the current year 340 and 1,000 line miles, respectively, are planned for construction.—**Walter Dreyer, vice-president and chief engineer.**

Los Angeles Department of Water & Power erects a four-circuit tower to tie new capacity to the system

San Diego Gas & Electric add the third 106-mw unit to its Encino station. Next addition will be at the South Bay plant

Riverside PU Dept.

Review of '58

Customers	28,526
Power sales	180,000 mwh
System peak	44 mw
Capacity	none
Construction	$1,000,000

In line with an ever-increasing number of utilities throughout the country, Riverside's 1958 system peak shifted from winter to summer, due to the increasing popularity of air conditioning. The system peak demand has doubled in the past six years.

The major project undertaken the past year was the engineering and award of contract for the new central Riverside substation. This consists of two 12/16/20-mva tap changing underload transformers and indoor switchgear lineup consisting of two 3,000-amp mains, a 3,000-amp tie and 18 1,200-amp feeders. The outdoor station structure terminating three 34-kv lines will be of structural aluminum – expected to be Southern California's first major aluminum substation.

A second single circuit sub (3,150 kva) was installed in the heart of the city's citrus area to serve an ever-increasing number of wind machines used for frost protection.

The department installed over five conductor miles of underground cable and 153 conductor miles of overhead lines.—**Don Campbell, utilities engineer.**

Sacramento MUD

Review of '58

Customers	142,800
Power sales	1,136,000 mwh
System peak	247 mw
Capacity	none
Construction	$12,200,000

The first heavy construction on the district's Upper American River project got under way this past September with the beginning of drilling on Jaybird tunnel. Clearing had commenced earlier for Ice House Dam and reservoir on the south fork of Silver Creek. Nine dams, seven tunnels and four power houses comprise the entire project, which is planned to be carried on in stages over the next 10 years.

Waterwheels, generators, transformers and major components of switchgear are already on order for the Jaybird power house, where the 67,000-kw unit No. 1 is scheduled to go on the line in November 1960.

$30,800,000 have been budgeted for plant expansion during 1959. Out of this total it is planned to spend about $17.5 million in continuing the Upper American River work. About two million dollars will be invested in transmission facilities, the major portion of which will be the 230-kv lines, to bring the hydro project energy down to the district's Hedge substation. Approximately $7.5 million is allocated to new distribution plant facilities and $3.5 million to general plant, which includes completion of the new office building.

Underground system supply facilities will account for a sizable portion of the distribution plant expenditures during 1959. Construction on a new 115/12-kv substation and a twin circuit 115-kv pipe-type cable system to supply it will be well under way before year end, with completion scheduled for mid-1960. The station will have an ultimate capacity to supply three separate 30-mva networks each via six 12-kv feeders.

Also in 1959 will be the elimination of the existing direct-current supply system to the remaining 41 customers. These customers have been informed of the district's plans to discontinue the supply of d-c by June 30, 1960. Each is being offered a choice of alternatives to give economic assistance in the change-over.

This program is being justified economically by the fact that it will permit shutting down the obsolete and highly inefficient rotary converters now being used and also freeing valuable duct space in the downtown underground area for use of 12-kv feeders to the a-c network system.

Continued growth in kw demand and energy usage during 1959 is expected to approximate 10%, while number of consumers is expected to increase by about 5%.—**Charles R. Day, supervising electrical engineer.**

San Diego G&E

Review of '58

Customers	293,100
Power sales	2,119,300 mwh
System peak	550 mw
Capacity	672 mw
Construction	$19,600,000

The 1959 construction program totals approximately $23,900,000. The major plant construction project in 1959 will be the continuation of construction at the South Bay plant site. Work on the first unit at this site is now well under way.

Unit No. 1 at South Bay will have a name plate rating of 136,500 kw. Steam conditions have been set at 2,000 psig, 1,000/1,000 F. The turbine-generator is being furnished by General Electric. The boiler will be manufactured by Babcock & Wilcox. Induced draft fans will be eliminated through the use of a pressurized furnace.

The plant will embody the so-called outdoor or open design. Circulating water tunnels have been eliminated through the use of open channels. Without any penalty at this time, consideration has been given to the possibility of future coal firing.

It is expected that the expenditures for the South Bay project during 1959 will approximate $12,000,000. By the close of the year all major equipment will be in the process of erection. The main structure, the circulating water system, and the fuel oil storage tanks will be complete. Peak employment for construction will occur either late in 1959 or early 1960.

In the design of South Bay, the company has sought to take advantage of every improvement consistent with anticipated fuel costs, capacity factor and future growth. The outdoor design, together with a number of other features, mark a first for the company.—**H. A. Noble, vice-president in charge of operations.**

Southern California Edison

Review of '58

Customers	1,562,000
Power sales	13,790,000 mwh
System peak	2,962 mw
Capacity	3,404 mw
Construction	$150,000,000

The budgeted amount for the calendar year 1959 is approximately $107,000,000 for system additions and betterments.

During the past year, 779.4 line miles of distribution circuits were placed in service and 156.8 miles of transmission circuits were constructed.

Two new generating units with an effective operating capacity of 435,000 kw were placed in service during 1958. They are Units 1 and 2 at Huntington Beach steam station.

The plant is designed for an additional two large units. The two units now installed are the first cross-compound machines in the West, and required some unique foundation treatment.

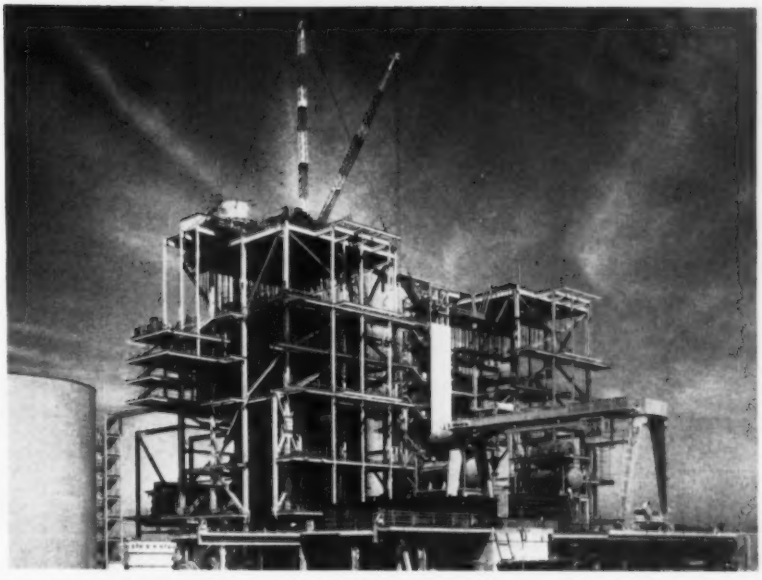
Currently under construction are: 440,000 kw of new steam generating capacity, consisting of two units at Mandalay steam station; and 150,000 kw maximum of new hydro generating capacity, consisting of two units at the Mammoth Pool project.

Construction work on Mandalay steam station was started in June 1957. It is a new station located on a coastal site of approximately 114 acres situated some four miles west of Oxnard and seven miles southeast from Ventura. It will be an outdoor-type plant with centralized control facilities, and the initial installation consists of two units that will essentially duplicate the Huntington Beach units. Unit No. 1 is scheduled for commercial operation in April 1959, and Unit No. 2 in September 1959. Presently estimated cost of the initial installation, exclusive of transmission lines, is $54,000,000.

Construction work on the Mammoth Pool project was initiated in January 1958. It is a hydroelectric power project including a dam, reservoir, appurtenant water conduit and penstock, power house, transmission lines and other necessary or useful structures and facilities.

The dam is of rolled earth-fill construction, across the San Joaquin River, in Fresno and Madera Counties, about nine miles upstream from the existing Big Creek power house No. 8. It will have a net height above foundation of about 450 ft. The crest length will be about 820 ft and the distance from upstream toe to downstream toe will be about 1,800 ft. It will create a reservoir with a gross capacity of about 123,000 acre-ft, which will be over eight miles in length.

The power house will be located some 7½ miles downstream from the dam. It will be an outdoor type and will contain two generating units, each having a reaction turbine directly connected to a 75,000 kw maximum capacity generator.



Southern California Edison Mandalay station will have an experimental saline water conversion unit for feedwater make-up. Plant will be on the line in 1959

Presently estimated cost of the project, scheduled for completion in 1960, is approximately $49,600,000.

In addition to completing the installation of the second 75,000-kva transformer bank at Santa Clara, nine new distribution substations are planned for construction in 1959. These new distribution substations, together with additional transformer capacity to be added during 1959 to existing transmission and distribution substations, will require approximately 576,300 kva of new transformer capacity.

Plans are in progress to construct 975.8 line miles of transmission and distribution circuits in 1959 and to connect approximately 58,000 new meters.—**H. A. Lott, manager, planning department.**

Turlock Irrigation District

Review of '58

Customers	19,800
Power sales	164,000 mwh
System peak	34 mw
Capacity	25 mw
Construction	$550,000

Construction during 1958 consisted principally of new distribution feeders and increasing conductor sizes on existing feeders. Substation transformer capacities were increased 7,500 kva. Transmission facilities were also increased with addition of substation breakers.

Construction expenditures totaled $550,000. 1959 construction budget of $630,000 is scheduled for similar construction plus 10 miles of transmission tie and associated transmission substation equipment.—**L. H. Parker, electrical engineer.**

COLORADO—System Peaks Up! '59 a Busy Year for Substation Construction

Colorado Central Power

Review of '58

Customers	32,450
Power sales	268,000 mwh
System peak	51 mw
Capacity	none
Construction	$1,675,000

The Colorado Central Power Co. expects to spend $1,950,000 for construction during 1959. Approximately $1,000,000 will be spent for connecting new customers during the year.

$400,000 were spent for major system improvements during 1958 and approximately the same amount is planned for this purpose during 1959. Approximately $200,000 are to

Public Service of Colorado continues expansion of its Cherokee station. Unit No. 2 scheduled for June of '59. The second unit will be 110,000 kw capacity

be spent for new street lighting during the year as both Englewood and Littleton have greatly increased their budgets for new and improved street lighting for 1959.

Approximately $350,000 are to be spent for new equipment and tools, including transportation, during 1959.

A new operation headquarters building was completed during the year in our Jefferson County Division at Golden, costing approximately $100,000. A total of $125,000 was spent for buildings during 1958, with a similar amount to be spent during 1959.

An agreement has been worked out with the telephone company to furnish the equipment to establish automatic intercompany dialing between all points of our company's four operating divisions, by using our existing microwave equipment instead of leased wires for interconnections. The telephone company is to install its equipment during 1959.—**Lee R. Jones, vice-president in charge of operations.**

Public Service of Colorado

Review of '58

Customers	303,100
Power sales	2,673,913 mwh
System peak	591 mw
Capacity	720 mw
Construction	$22,687,000

The budget for the 1959 electrical construction program is presently scheduled at $24,635,000.

The second steam-electric unit, rated at 110,000 kw, now under construction at Cherokee station north of Denver, is scheduled for commercial operation in 1959.

In February 1958 approximately 30 miles of 115-kv transmission line were placed in service in the Salida area interconnecting Public Service Co. of Colorado and the Southern Colorado Power Co. In March 1958 about 35 miles of 115-kv transmission line were energized interconnecting the Denver area of the Public Service Co. of Colorado with the city of Colorado Springs. Also during 1958 approximately 30 miles of 69-kv transmission line were placed in service in the Alamosa area.

During 1958 transmission substation capacity was increased by 9,400 kva, and additions to the distribution substation capacity to serve load growth totaled 47,800 kva, including a new 115/13-kv substation in Denver.

The 1959 construction program includes 56 miles of transmission line and 160,000 kva of transmission substation capacity, including a new 130,000-kva, 115/13-kv transformer bank for the second generating unit at Cherokee station. Expenditure on distribution facilities for 1959, in addition to extensions, services, etc., will provide 82,200 kva of substation capacity including a new 115/13-kv substation in Denver. —**M. M. Koch, executive vice-president.**

Southern Colorado Power

Review of '58

Customers	47,500
Power sales	360,000 mwh
System peak	67 mw
Capacity	85 mw
Construction	$5,500,000

Completion of the Canon City 22,000-kw addition was scheduled for March 1959 but a combination of several fortunate circumstances has accelerated the construction, so that start-up was made Dec. 11, 1958.

We have also practically completed a fairly large transmission substation in the vicinity of La Junta, Colo. The 115-kv and 69-kv breakers will be controlled 75 miles away at Pueblo by means of carrier and microwave.

1958 is the first year in which we have operated as a member of a large power pool, and these interconnections have proved to be of quite substantial worth to us.

At the present time it would appear that 1959 will be more of a normal year for us, since no major projects have been budgeted. We will, of course, be constructing some substations, some short transmission lines and converting some distribution to higher voltages, in order to remain in a continued good position for maintaining or improving customer service.—**W. C. Porter Jr., vice-president in charge of operations.**

MONTANA—Expenditures Up From $4.7 to $7.3 Million for Montana Power

Montana Power

Review of '58

Customers	145,667
Power sales	3,550,739 mwh
System peak	515 mw
Capacity	671 mw
Construction	$4,730,103

Major construction project scheduled in 1959 is construction of the 93-mile 161,000-v transmission line from Missoula to Anaconda, Mont. This project will extend the 161-kv line from the company's Kerr hydro development in western Montana and will give the company two such lines from Kerr into the Anaconda load center.

Also programmed for 1959 is completion of the company's east-leg microwave system to Billings, Mont. This will complete a system-wide microwave network which extends from Butte to Pakowki Lake, Canada; to Missoula and Kerr in the west and to Billings in the east.

Looking to future development, the company has filed an application with the Federal Power Commission to redevelop its Thompson Falls hydroelectric plant in western Montana under an extended 50-year license. Planned for the future at this plant is installation of 35,000 kw of additional power, bringing the plant's capability to a total of 65,000 kw.—**Colin W. Raff, vice-president.**

NEVADA—Southern Nevada's Peak Up 7%. Sierra Pacific Up 18%. Spending Holds

Sierra Pacific Power

Review of '58

Customers	39,400
Power sales	454,000 mwh
System peak	101 mw
Capacity	9 mw
Construction	$2,750,000

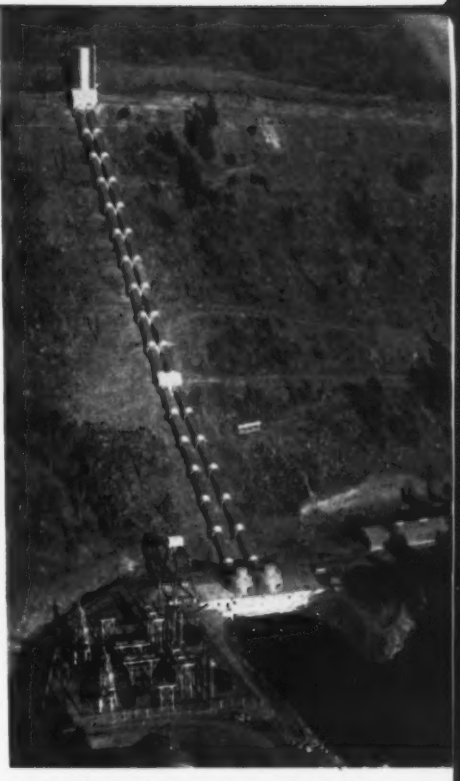
The growth pattern of the past several years continued through 1958 in western Nevada and the Sierra region of eastern California.

The Lake Tahoe region in the High Sierra is expanding at a rapid pace with expansion being further accelerated in anticipation of the 1960 Winter Olympic Games. It became necessary this past year to add a second 5,000-kva, three-phase, 60 to 14.4-kv unit to the South Lake Tahoe substation and a new 5,000-kva, three-phase, 60 to 14.4-kv unit substation was built at Squaw Valley, site of the 1960 Winter Olympics.

Our plans for 1959 call for an additional 5,000-kva, three-phase, 60 to 14.4-kv substation at North Lake Tahoe and a new 60-kv feeder about 12 miles in length from Truckee, Calif.

Carson City, the capital of Nevada, will require a new 2,500-kva, 60 to 4-kv substation to serve the south section of the city.

A new system switching and regulating station will be built at Reno Junction, southwest of Reno.—**M. H. Atcheson, chief engineer.**



Copco's Big Bend power house with 11/230-kv substation in the foreground

OREGON—Utility Spending Off—to $50 million Following Biggest Generation Year

California Oregon Power

Review of '58

Customers	89,561
Power sales	1,870,000 mwh
System peak	349 mw
Capacity	399 mw
Construction	$13,281,000

Major items of construction that will be started in 1959:

1. Operating centers consisting of new office building, warehouse, garage and other miscellaneous buildings will be started at both Klamath Falls and Medford, Ore.

2. Completion of a 21-mile section of the proposed 125-kv transmission line between Chiloquin and Lakeview, Ore.

3. Completion of a 39-mile section of the proposed 230-kv transmission grid between Reston and Medford, Ore., via Dixonville substation.

4. Completion of an 18,750-kva 120/66-kv substation at Bly, Ore.

5. Continuation of preliminary plans for development of additional hydro plants.—**J. C. Boyle, vice-president and general manager.**

Eugene Water & Electric Board

Review of '58

Customers	26,900
Power sales	440,000 mwh
System peak	109 mw
Capacity	56 mw
Construction	$1,702,500

The board's budget for the year 1959 provides for $1,830,000 of capital expenditures. Among other items planned is a two-mile section of 69 kv to be rebuilt to reinforce the board's subtransmission loop, the addition of one 10,000-kva 69/12-kv transformer in an existing substation, several major cutovers from 2,300 v to 12 kv on distribution feeders, and the expenditure of about $230,000 on the continuation of the planned expansion of the business district underground network system.

Eugene's long-time rate of load growth, covering the past 20-year period, has been an average rate of 12.3% per year on peak load and 13.8% on annual system energy. The Eugene system peak is now just short of 110,000 kw with an expected winter peak of about 113,000 kw.

Plans are under way for the addition of a hydroelectric generation project on the Upper McKenzie River, providing an addition of 56,000 kw of capacity by 1962. Additional limited generating capacity will also be available from Priest Rapids and the Wanapum projects on the Columbia River under contractural arrangements with Grant County PUD in Washington.—**Ralph W. Martin Jr., chief engineer.**

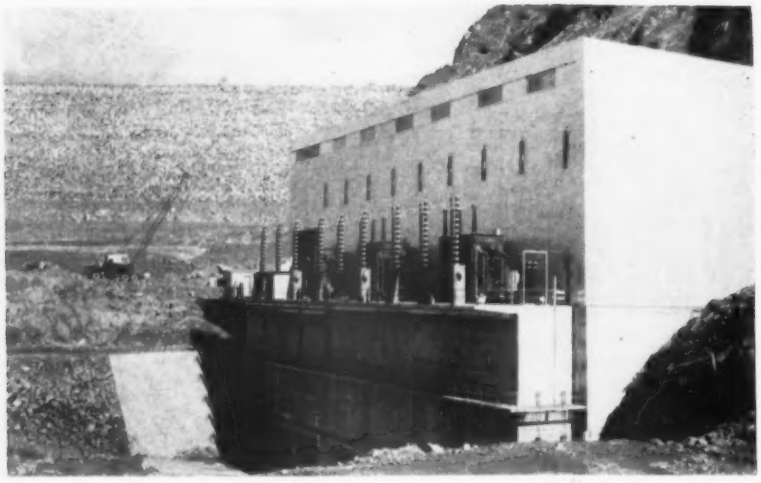
Pacific Power & Light

Review of '58

Customers	279,843
Power sales	3,946,946 mwh
System peak	858 mw
Capacity	782 mw
Construction	$60,376,000

Pacific Power & Light Co. has budgeted $23,500,000 for construction activity during 1959, principally for transmission, distribution and substation facilities for customer services throughout the company's operating districts in five Pacific Northwest states.

The outlay represents a new high level of normal construction activity for the company, according to PP&L President D. R. McClung, who reported PP&L expects to be investing $100,000,000 in transmission and distribution plants during the next five years.



PP&L's new 208,000-kw Swift project raises Lewis River capability to 533,000 kw. The earth-fill dam is reputed to be the highest in the world—512 ft high

The new year's budget follows an all-time record $60,000,000 in construction expenditures that in 1958 brought to completion three major power projects adding 349,000 kw of generating capacity to the company's system.

During 1959 PP&L expects to build 94 miles of transmission line of 66 kv or higher capacity and boost related substation capacities by 340,000 kva, requiring a total $6,536,000; and plans to add 250 miles of distribution circuit and 99,250 kva distribution substation capacity, budgeted at $3,425,000.

Successful completion of three major power plants, which doubled the company's capacity; sponsorship of geological surveys of Northwest coal reserves; and a role in investigations of a new-type nuclear energy reactor have highlighted the company's progress during the past year.

PP&L now serves 305,200 customers. Annual average use of electricity in residences served by Pacific Power topped 7,000 kwh for the first time. Customer use of electricity increased to 3,973,234,200 kwh for the year. Annual revenues from the company's services in 1958 were approximately $52,000,000.

The company's studies looking to future power needs embrace the possibilities for developing coal deposits in Washington and Oregon to supply fuel for future steam-electric power plants in the area, and co-sponsorship of a new-type nuclear reactor system for generating electricity.

Pacific Power has been studying the Eden Ridge coal seams in southwest Oregon's Coos County, where a steam plant may be combined with a hydroelectric plant on the south fork of the Coquille River. Extensive explorations in coal fields of Lewis and Thurston Counties in Washington state were continued under a program sponsored jointly by Washington Water Power and Pacific Power & Light companies. The companies have reported reserves of 70,000 tons of subbituminous coal have been mapped.

Pacific Power is one of the 50 utilities supporting a proposal before the AEC to build an experimental nuclear plant.

At the dedication of its Dave Johnston steam-electric plant in Wyoming in December, Paul B. McKee, chairman of the board, announced the company would start construction of a second 100,000-kw unit in May. It is scheduled for completion in October 1960.

Portland General Electric

Review of '58

Customers	245,000
Power sales	3,600,000 mwh
System peak	821 mw
Capacity	424 mw
Construction	$27,000,000

Expenditures for new transmission and distribution construction and normal system improvements will amount to $12 million, approximately the equivalent to the amount accomplished in 1958.

The year 1958 saw the completion of three major hydroelectric projects: the 120,000-kw Pelton project on the Deschutes River, and the North Fork and Faraday projects on the Clackamas River, having a combined capacity of 72,000 kva.

The high-voltage transmission system to overlay the 57-kv system in the Willamette Valley got off to a good start in 1958 with the completion of three major 115-kv switching stations with their associated new 115-kv lines. The year 1959 will see a continuation of this program with the building of two more 115-kv stations and one 230-kv station with their new interconnecting lines. Distribution substation capacity will be increased by nearly 80,000 kva during the coming construction year.

Test drilling and preliminary investigation of the 300,000-kva Round Butte site on the Deschutes River have now been completed and an application for a preliminary permit has been filed. The total cost of the project with its associated 230-kv transmission to the PGE system in Salem is estimated to be $71,000,000. It is hoped that construction can commence in 1960.—**W. D. Smith, chief planning branch.**

NEW MEXICO—Spending Holds for '59. Reeves No. 2 on the Line in '60

Public Service of N. M.

Review of '58

Customers	91,200
Power sales	621,000 mwh
System peak	167 mw
Capacity	208 mw
Construction	$8,420,000

The board of directors of the Public Service Co. of New Mexico has approved a 1959 construction budget for the company of more than $9 million.

Largest single item in the budget is $3,400,500 to be used for continuing construction at Reeves station, the company's new generating station north of Albuquerque. Construction is nearing completion on the first 50,000-kw unit at the station and construction on the second 50,000-kw unit is already in progress. Total investment in the plant, when the second unit is finished in 1960, will be over $15 million.

In Albuquerque, exclusive of Reeves station, the company will spend about $4,100,000 on improvements. The budget calls for completion during 1959 of a 115,000-v transmission loop which will surround Albuquerque and provide al-

ternate transmission paths connecting the company's three power plants in the Albuquerque area.

In the Deming division the budget calls for spending $222,000.

For its Las Vegas division, the company will spend $76,150 in the electric department.

In Santa Fe, Public Service has budgeted $204,490 for the electric department improvements.

In Belen, improvements on the electric system will cost $101,200, including conversion of a number of distribution lines from 2.3/4.16 kw to 7.2/12.5 kw to increase capacity improve service to the company's customers.

Above—Portland G-E's Pelton Dam is a new 120,000-kw power source. Below—Utah P&L uses helicopter to put poles on peak

UTAH—UP&L Starts Kemmerer Plant in '59. Richfield 230-Kv Line bolsters Telluride Supply

Utah Power & Light

Review of '58

Customers	224,000
Power sales	3,059,000 mwh
System peak	616 mw
Capacity	713 mw
Construction	$12,500,000

Utah Power & Light Co. and its subsidiaries have budgeted over $13 million for construction expenditures in 1959.

Budgeted for start of the proposed Kemmerer, Wyo., steam-electric plant and betterments to existing production facilities is $540,000. Initial expenditures for the start of the Kemmerer project, which when completed in 1963 is estimated to cost $34 million, cover the commencement of construction of a reservoir on Hams Fork River to provide water sufficient for the ultimate development of one-half million kw of capacity at the Kemmerer site.

Transmission expenditures of $5,500,000 include construction of 67 miles of 230,000-v line from Nephi, Utah, to Richfield, Utah, to transmit power to the company's subsidiary, the Telluride Power Co. This line, estimated to cost $1,800,000 and operating at 138,000 v, will initially strengthen the power supply to the heart of the Telluride area, but later it will be available as the first leg of a 230,000-v transmission line to bring power from Glen Canyon to the Salt Lake City area when Glen Canyon power becomes available.

Extension of distribution facilities to new customers and improvements of existing facilities in 1959 is estimated at $6,310,000.

Expenditures of $800,000 for general system improvements round out the total figure of $13,150,000.—**E. A. Hunter, administrative assistant.**

WASHINGTON—Construction Activity Up 10%. Hydro Activity at All Time High

Cowlitz County PUD

Review of '58

Customers	21,340
Power sales	670,000 mwh
System peak	118 mw
Capacity	62 mw
Construction	$16,880,000

The construction program for 1959 calls for the expenditure of approximately $900,000 for system improvements out of a total budget of nearly $4,000,000.

Under the heading of rebuilding and reconductoring will be 7.6 miles of line in the Longview-Kelso area along with the construction of 8¼ miles of new feeder lines in the same area. Conversion will be effected of some 3,300 kva of substation capacity with the complete elimination of the old Beech Street substation in Longview.

Outside area work calls for reconductoring four miles of line in Woodland, Wash. The Kalama, Wash., Port Dock Feeder will be reconductored for a distance of .35 mile and construction of a one-mile tie line will be effected at Ariel, Wash.

New 69-kv transmission lines will be built for a total distance of 8.55 miles and include Castle Rock to Vader, Wash. The Beacon Hill area north of Longview and from the Lexington substation to the proposed North Kelso substation is scheduled for construction during 1959.

In addition, a new warehouse will be built at the district's Castle Rock substation.

Need has also arisen for the installation of a new radio communication system to replace the old system. Application has been made for a new frequency, which will be more satisfactory to the district's needs.

A $30,000 addition will be made at the district's Columbia Way substation in Longview to handle the additional capacity being installed by BPA.

Also planned during 1959 is the move of the dispatching center from the Columbia Way substation to modernized and expanded quarters at the district's substation A located at 10th and Hemlock Streets in Longview, Wash.

The entire construction program will be financed out of revenues and is aimed at providing additional ca-

Grant County PUD's Priest Rapids Dam, now 65% completed, will bring 790,000 kw to the Northwest. Wanapum Dam, of similar size, will be located 18 miles upstream

pacity and at the same time making available the most reliable service possible for our customers. Experience has indicated that we must continually provide for increased utilization of electricity by our owner consumers, which reached an average of 12,207 kwh per residential customer in 1957.—**O. G. Hittle, manager.**

Grant County PUD

Review of '58

Customers	14,000
Power sales	302,000 mwh
System peak	88 mw
Construction	$36,800,000

Construction activity will continue in high gear at Priest Rapids Dam during 1959. The dam is 65% complete and the job nearly a year ahead of schedule.

Priest Rapids Dam is being built by the Public Utility District of Grant County. It is located 24 miles below Vantage, on the Columbia River. Approximately $36,100,000 were spent on Priest Rapids Dam during 1958, and an estimated $36,500,000 will be expended in 1959. The dam will contain 10 generators with a total name-plate rating of 788,500 kw.

The Harza Engineering Co. of Chicago is the designing and supervising engineering firm for the project, which includes both Priest Rapids and Wanapum Dams.

Work scheduled at Priest Rapids for 1959 includes the completion of the 11 spillways in the right half of the spillway section.

The power house, 1,025 ft long with a base width of 197 ft, will be roofed over. Switchgear will be installed in the control room and mechanical piping systems and pumping units will be placed in the power house. Erection of exterior cranes will be completed for the handling of heavy equipment.

The latter part of the year will see the installation of turbines and generators so that two to five units will be on the line with low head operation producing power as water is available.

It is expected that by late summer of 1960 all 10 generating units will be in commercial operation.

The twin tower transmission lines from Priest Rapids to the Bonneville Power Administration substation at Midway (about 7 miles) will be completed.

An average of 1,500 men were on the job during the year 1958, with a peak of 1,650 men in late summer and the fall. Employment probably will level off during 1959 at about the average of the previous year, with a gradually diminishing number of workmen toward the end of the year as the job nears completion.

The schedule of the PUD calls for the start of the second dam, Wanapum, 18 miles upstream from Priest Rapids, in the summer of 1959. This will be a separate contract from Priest Rapids Dam and, like Priest Rapids, will be financed through the sale of a revenue bond issue.

Wanapum will have about the same output as Priest Rapids Dam. —**Herb Jenkins.**

Lewis County PUD

Review of '58

Customers	11,841
Power sales	124,597 mwh
System peak	30 mw
Capacity	none
Construction	$400,000

Approximately two miles of the district's 46-kv transmission system were rebuilt and reinsulated for 69 kv, leaving approximately two miles to be rebuilt and reinsulated in 1959. In 1959 all of the district's 46-kv system will be converted to 69 kv.

In order to accomplish the complete conversion, four of the present 46-kv substation transformers will be replaced with 69-kv transformers. Three of the banks will have a self-cooled rating of 3,750 kva and one bank will have a self-cooled rating of 7,500 kva. The total substation capacity of these four stations will be increased from 10,500 kva to 18,750 kva.—**M. D. Johnston, manager.**

Puget Sound Power & Light

Review of '58

Customers	206,400
Power sales	2,375,000 mwh
System peak	599 mw
Capacity	263 mw
Construction	$31,500,000

During 1958 construction of the company's 158,000-kw Baker River project continued on schedule. This project consists of two parts: the new Upper Baker Dam, reservoir and power house with two hydraulic turbogenerators of 94,000 kw capability and the addition at the Lower Baker plant of a second penstock, an extension of the power house, and a new 64,000-kw generator. A barrier dam and fish handling facilities below the Lower Baker power house have been completed and were in operation for this year's run of spawning salmon. The entire project is expected to be in operation during 1960.

In 1959 Puget expects to continue the Baker River project. In addition, it is planned to construct about 25 miles of transmission lines and add 105,000 kva of transformer capacity in a new transmission substation. Capacity of distribution substations is expected to be increased by 35,000 kva by the construction of four new substations and by increasing the capacity of 10 existing substations.

A new division office building and three new line headquarters are planned for 1959.

Total plant expenditures for the year 1959 are currently estimated at about $23,650,000, of which $10,700,000 will be for production plant improvements, $1,750,000 will be for transmission plant, $9,900,000 will be for distribution plant, including expenditures to serve new customers, and $1,300,000 will be for general plant improvements.—**Frank McLaughlin, president.**

Seattle City Light

Review of '58

Customers	229,000
System peak	821 mw
Capacity	718 mw
Construction	$16,950,000

Total expenditures for electric plant construction during 1959 are expected to total $20,378,000. This expenditure will be distributed as follows:

Hydraulic plant	$13,480,000
Transmission plant	398,000
Distribution plant	6,190,000
General plant	310,000

Construction of Gorge Dam will continue during 1959. First-stage concrete work in the gravity section, second-stage diversion and commencement of excavation for the arch section will be accomplished by spring of 1959. The intake structure and the installation of equipment will be substantially completed by the end of 1959. The installation of two new turbine runners at the Gorge power house will be performed during the spring shut down. A warehouse and shops building and residential construction at Newhalem will complete the expenditures to our Skagit hydroelectric project.

Engineering studies on the modernization of the headworks at Cedar Falls have been completed. Contingent upon favorable results from feasibility studies, construction will begin on a new intake at Morse Lake and a connecting tunnel to the existing masonry dam. The conversion of the power house to automatic operation and painting the interior of existing penstocks will be completed during the year.

Engineering studies will continue on our proposed hydroelectric plant at the Boundary site on the Pend Oreille River. Pending a favorable decision and the granting of a license after a hearing by the Federal Power Commission, we will proceed with final engineering and commence preliminary construction.

Transmission plant construction totaling $398,000 will be entirely line work. The rebuild of the Cedar Falls line from 55-kv to 115-kv will be completed and additional short lines off 115-kv lines will be constructed in our service area to serve as ties between substations. Acquisition of right-of-way for our Valley Tukwilla Duwamish 230-kv line and final engineering will proceed this year.

Distribution plant expenditures cover the commencement of work to convert Canal substation from 13 kv to 26 kv, the installation of approximately 50,000 kva of unit substation capacity, services and meter, reactive requirements, distribution circuits and relocation work necessitated by the Tacoma-Everett Freeway.—**H. V. Strandberg, chief engineer.**

Snohomish County PUD

Review of '58

Customers	56,650
Power sales	940,000 mwh
System peak	208 mw
Capacity	none
Construction	$2,525,000

Our construction budget for the year 1959 is estimated at $2,854,932. Major items include additional capacity to be added to the Everett substation, $265,000; additions to the waterfront substation in Everett, $75,000; increasing the capacity of old lines and construction of new lines, $255,000; construction of substations in the Silver Lake and Five Corners areas $130,000 and $185,000, respectively; increase the size and capacity of several substations, $66,000. It is also planned to extend the 55-kv line to Sultan and to construct a substation at Sultan at a cost of $90,000. A total of $1,505,000 was allocated for meters and installation, transformers and installation, added load, new business and line extensions.—**A. S. J. Steele, manager.**

Tacoma City Light

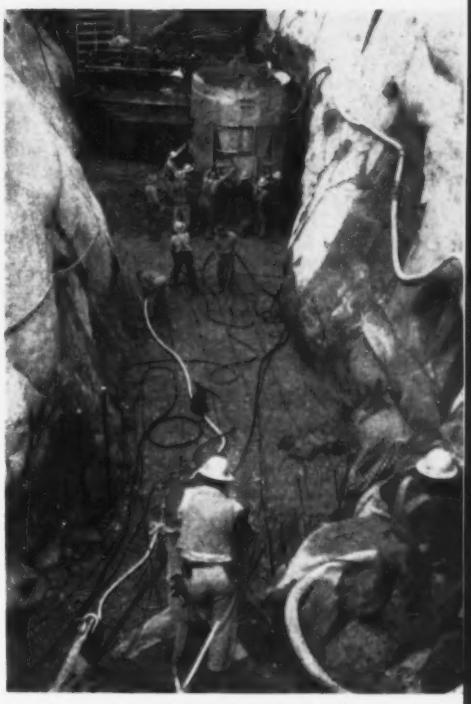
Review of '58

Customers	62,900
Power sales	1,943,776 mwh
System peak	382 mw
Capacity	297 mw
Construction	$2,874,249

Resumption of the construction on the Cowlitz River development looms as a possibility for the year 1959.

U. S. Supreme Court in June of this year ruled unanimously that Tacoma has authority to condemn the State's Mossyrock fish hatchery. In a subsequent action Judge John E. Murray of the Lewis County Superior Court signed an order of public use and necessity giving Tacoma the right to condemn, completed the clearing away of legal obstacles.

A review of the engineering feasibility has been completed by the Harza Engineering Co. to be followed, before the close of 1958, with a report from the consulting firm of Ford, Bacon & Davis, concerning the financial aspects. The declaration by the Harza company that a rockfill dam is technically feasible at the Mossyrock site is gratifying. They estimate that an 18- to 19-



Workmen pouring concrete for first-stage construction of Seattle City Light's high Gorge Dam. At the time of picture they were approximately 25 ft above bedrock

million-dollar saving is afforded when compared with the gravity-arch-type structure on which former estimates were based.

Expenditures in 1959 for electric plant construction, other than the $11,780,000 estimated for the Cowlitz project if it should get under way early in the year, have been estimated to total $2,996,000. Distribution plant expenditure will consume approximately 80% of the latter figure. Ten per cent will be utilized in hydro-generation facilities, 1% in transmission plant and the remaining 9% in miscellaneous items. The program calls for approximately 6 miles of 55-kv overhead line, 50 miles of overhead distribution line, 2 miles of underground distribution and 45,000 kva in distribution substations.—**Everett E. Martin, cost and rate engineering.**

Washington Water Power

Review of '58

Customers	144,751
Power sales	2,648,000 mwh
System peak	607 mw
Capacity	401 mw
Construction	$32,450,820

On Aug. 1, 1958, the company made its "big move" to a $7½ million general office and service center

located on a beautifully landscaped 28½-acre tract at Mission and Upriver Drive in Spokane. The new center was built in two major phases. The service building, representing an investment of approximately three million, was finished and occupied first in 1956. A five-story office building and a combination auditorium-cafeteria building were completed in 1958. All functions of WWP's general office, with the exception of a downtown customer service office, are now conducted at the new facility.

In August 1959, the first of four 100,000-kw generators at Noxon Rapids dam will go on the line. The others are scheduled to follow at three-month intervals.

Noxon Rapids, with its 400,000-kw generating capacity, will approximately double WWP's generating capability. Costing an estimated $87 million the dam is on the Clark Fork River in western Montana, 38 miles above the utility's Cabinet Gorge hydroelectric development.

WWP also has long-term, in most cases 50-year, contracts with the Grant and Chelan County Public Utility Districts for purchase of power from Priest Rapids, Wanapum, Rocky Reach and Chelan Falls Dams. The first three are new projects being built by the PUDs and financed by area utilities. The Chelan Falls Dam was built by WWP some years ago and acquired through condemnation by the Chelan PUD. The PUD has sold all of the power generated at Chelan Falls to WWP on a 35-year contract.

During 1959 WWP plans to spend slightly more than $12 million for new power generating facilities, almost all of it on Noxon Rapids. $5,579,000 have been budgeted for new transmission facilities, $2,500,000 for distribution facilities, almost $2,000,000 on gas expansion and just under $600,000 for general and miscellaneous construction. — **Allan F. Elder, treasurer.**

Workmen use tension equipment in stringing highest voltage line in the islands, 138 kv

HAWAII—Island Utilities to Have Biggest Transmission Year, Highest Voltages

Hawaiian Electric

Review of '58

Customers	106,500
Power sales	1,050,000 mwh
System peak	249 mw
Capacity	340 mw
Construction	$10,369,000

Construction for the installation of generating unit Waiau No. 5 was well under way by the end of 1958. This 50,000-kw unit will be the first outdoor unit on our system and is scheduled for completion in October 1959.

A program of installing automatic voltage regulators on all major generating units was completed during the year.

Construction was started on a 13-mile 138-kv line from Waiau generating station to Koolau switching station. Sixteen steel towers and 53 woodpole structures were installed. Two aluminum towers were installed at the highest point of the Koolau mountain range where salt-ladened air is predominant. This 138-kv line will be completed in 1959 and will be operated initially at 44 kv.

Total distribution substation capacity was increased by 42,375 kva. Construction was started on a 18,750-kva substation at Puuloa to serve the Pearl Harbor Naval Shipyard. This substation will be in addition to the existing 18,750-kva substation at station G.

Distribution systems for 32 subdivisions totaling 2,734 homesites were completed. Approximately 23,000 kva of distribution transformer capacity was added during the year. The downtown underground secondary network system capacity was increased by 1,250 kva.

Supervisory control of the 44-kv system was extended to Wahiawa substation by installation of carrier equipment on the two 44-kv lines from Waiau power plant. — **L. W. Lengnick, vice-president and executive engineer.**

Maui Electric

Review of '58

Customers	10,460
Power sales	66,850 mwh
System peak	18 mw
Capacity	21.5 mw
Construction	$260,000

During 1958 we extended a 22-kv transmission line from Keokea on the slopes of Haleakala for a distance of six miles to serve a CAA communication station and a few isolated residences.

Another 22-kv transmission line extension of four miles is under way from another direction in this same area. This extension will presently terminate in a 22-kv to 12-kv substation now under construction.

Finally, another gap of four miles of 22-kv transmission line will be built in 1959. This will complete a 22-kv transmission loop serving the south shore and providing an alternate feed to upland areas. The construction of a 14-mile 22-kv transmission line from Haiku to Kailua is also scheduled in 1959. — **R. R. Lyons, vice-president and general manager.**

ALASKA—Statehood Spurs Construction Activity. Chugach May Have Atomic Generation

Anchorage L&P Dept.

Review of '58

Customers	8,257
Power sales	66,835 mwh
System peak	16 mw
Capacity	22 mw
Construction	$447,000

By the end of the 1959 construction season, the Municipal Light & Power Department will complete 30 city blocks of underground electrical facilities in the downtown area at an approximate cost of $1,000,000. This is a complete conversion of a 5-kv overhead system to a 5-kv network primary underground system with radial secondaries. Ducts are provided for a future secondary network system. Load for this service area is estimated at 5,000 kw.

A new 3,000-kva substation will be placed in service in 1959 to relieve overloading conditions in a residential area.

In December 1958 a new radio-controlled traffic signal system at 31 intersections, supplemented with a radar traffic signals system at six intersections, will be completed at a cost of approximately $180,500.—**Edward E. Bass, chief electrical engineer.**

FEDERAL AGENCIES—Corps of Engineers —Bureau of Reclamation —Bonneville Power Administration —Rural Electrification Administration

Corps of Engineers

● Bruces Eddy Dam site is located in Idaho on North Fork Clearwater River about two miles above its confluence with the main stem. An allotment of $500,000 for advance planning and design was received for the fiscal year ending June 30, 1959. At present, one exploratory drilling contract in the vicinity of the dam has been awarded.

The dam will have a generating capacity of 240,000 kw and will add 228 million kwh of generation to downstream projects. No construction date has been set.

● Chief Joseph Dam's 16th generating unit went on the line officially on Sept. 27, 1958. The 16th unit on the line completed the initial power installation at Chief Joseph Dam seven weeks ahead of original schedule.

The present total rated capacity of the plant is 1,024,000 kw. Plans contemplate expansion of the power plant with four units when Congress appropriates construction funds, and eventually the addition of seven more to a total of 27 units when justified by adequate upstream water storage.

The original investment estimate for the project was $206 million in the authorizing document. That figure has been reduced to a current estimate of $148 million for completion with the first 16 units in operation.

● Fort Peck Dam is on the Missouri River near Glasgow, Mont. This plant currently has an installed capacity of 85,000 kw. But construction is under way on a second power plant at the Fort Peck Dam which, when completed, will house two additional 40,000-kw generators. They are expected to be in operation in 1961. Some of the power from this plant feeds west into the power lines of Montana Power Co.

● Ice Harbor Lock and Dam is the farthest downstream of four authorized multipurpose projects on the lower Snake River. The project is being constructed in three steps within two cofferdams, one on the south shore and one on the north shore of the river.

The contract for completion of the power house structure for three units and the installation of all power generating equipment has been awarded. In conjunction with this phase of the work, a separate contract will be advertised for the manufacture, delivery and installation of three 90,000-kw generators early in calendar year 1959.

Actual construction work at Ice Harbor started in January 1956 and the entire project is rated as approximately 35% complete as of the close of 1958. Power on-the-line for the three 90,000-kw generating units is scheduled for December 1961.

● John Day Lock and Dam has been under way throughout the fiscal year 1958-1959 with an inaugural ceremony held on Nov. 7, 1958. The principal contract in effect at John Day is the first-step cofferdam contract for $1,395,435 held by the Morrison-Knudsen Co. Inc. with

John Day Dam upstream embankment signals start of power giant on the Columbia

USBR's completed Glendo power plant and switchyard with surge tank in the foreground

completion date set for Aug. 30, 1959. A drilling and grouting contract and a contract for the construction of a project office and utility buildings are scheduled for early completion. The contract for the north shore access road is complete.

A contract for the excavation of the navigation lock will have a bid opening early in January of 1959.

● The proposed Libby Dam was authorized by the 1950 Flood Control Act as a unit in the Corps of Engineers' comprehensive plan for development of the water resources of the Columbia River Basin in the interests of flood control, power generation and related water uses. The dam site is located on the Kootenai River near the town of Libby in northwestern Montana.

The main structure will be a concrete gravity dam, about 400 ft high and 2,700 ft long at the crest. Each of the four initial and eight ultimate main generators will have a capacity of 86,000 kw. The reservoir will provide 5,010,000 acre-ft of usable storage capacity. Cost of the project, based on July 1958 prices, is estimated at $308,000,000 (four units).

The development of the Libby project is contingent upon approval by Canada through the International Joint Commission because the reservoir would extend 42 miles into Canada. The United States application for approval of the Libby project now awaits action by this commission.

● Lower Monumental Lock and Dam, the next upstream dam on the Snake River from Ice Harbor, received $550,000 for the fiscal year ending June 30, 1959, to continue advance engineering and design. Tentative location is about 42 miles upstream from the mouth of the river at the head of Ice Harbor pool. The reservoir will extend slackwater navigation about 30 miles further upstream. The dam as presently planned will have an effective height of about 93 ft and an initial power installation of three main units totaling 270,000 kw capacity rating. Three skeletonized power unit bays will be included to provide for an ultimate installation of six units totaling 540,000 kw. No date for power-on-the-line or start of construction work is scheduled.

The Portland District, Corps of Engineers, has three projects under construction that include power development.

● The Dalles project, located on the Columbia River three miles east of The Dalles, Ore., is being constructed with an initial installation of 14 78,000-kw main units, two 13,500-kw fish-water supply units and two 3,000-kw station service units. Power house substructure to increase the ultimate installation to 22 main units has been provided with the initial construction. The fish-water supply units and six main units are in commercial production of power. The remaining eight units will be placed in operation at three-month intervals starting January 1959.

● Hills Creek project on Middle Fork Willamette River will consist of a flood control reservoir and a power house. The power installation will be two 15,000-kw units. Construction of the dam and appurtenances is under way with right abutment rock excavation and placing of embankment in progress. Stream flow was diverted through the diversion tunnel on Nov. 25, 1958.

● Cougar project on South Fork McKenzie River will consist of a flood control reservoir and a power house. The initial power installation will be two 12,500-kw units. Clearing of the dam site and reservoir areas, construction of diversion tunnel, stripping and excavating the dam abutments, and relocation of roads in the area have been accomplished. Contract plans and specifications for construction of the dam, outlet works, and power intake works have been essentially completed.

Bureau of Reclamation

● Work on construction of the Glen Canyon Dam and power plant was about 25% completed by year's end. The dam and power plant, principal features of the storage project, are on the Colorado River in north central Arizona, about 12 miles downstream from the Arizona-Utah state line.

Glen Canyon Dam is to be a concrete arch structure having a height of 700 ft, a crest length of 1,550 ft and a volume of more than 5,000,000 cu yd. The power plant will have eight 112,500-kw generators, each driven by a 155,500-hp turbine. Total name-plate capacity of the plant will be 900,000 kw. The plant will be the third largest hydroelectric power installation of the Bureau of Reclamation, surpassed only by the 1,974,000-kw Grand Coulee power plant and the 1,249,800-kw Hoover power plant.

The Colorado River storage project and 11 participating projects included in the Congressional authorization of 1956 will develop the water and land resources in areas of the five upper Colorado River Basin states—Arizona, Colorado, Wyoming, New Mexico and Utah. When completed, Glen Canyon power plant will produce a substantial amount of the electrical energy needed in the Upper Colorado River Basin. First power is expected to be produced in 1963.

● Collbran project specs may be issued in March to bid on construction of two power plants on the project. They are the Upper and Lower Molina power plants, about 40 miles east of Grand Junction in western Colorado. The Upper Molina plant will have a single 8,400-kw generator and will operate under a maximum static head of about 2,400 ft. The Lower Molina plant will have a single 4,600-kw generator and will operate under a maximum static head of about 1,300 ft. The

plants are to include seven miles of plate-steel pipe penstocks and an equalizing reservoir.

• Construction of the Big Thompson power plant and switchyard, near Loveland, Colo., was about 90% completed at the end of 1958. The plant, which will house one 4,500-kw generator driven by a 6,300-hp turbine, is scheduled to be placed in operation this summer. The power house is of the outdoor type having a reinforced concrete substructure. The 13.8-kv switchyard will interconnect with the project's Flatiron power plant to bring the total hydroelectric generating capacity of the transmountain diversion project to 183,950 kw.

• Construction of the Green Springs power plant structure was essentially completed by the end of 1958. Installation of the plant's single 16,000-kw generator, which will be driven by a vertical shaft, multi-nozzle, impulse-type turbine of 23,500-hp capacity, is expected to begin in February. The power plant is a feature of the project's Talent Division near Ashland in southwestern Oregon. Construction was about two-thirds completed at the end of 1958 on the power conduit and tunnels which, together with the power plant's penstock, will deliver water to the plant from the project's Keene Creek Dam. The total length of the conduit, tunnels and penstock is about four miles.

• In July, construction began on Flaming Gorge Dam and power plant, major features of the storage project. The dam and power plant are on the Green River in northeastern Utah about six miles south of the Utah-Wyoming state line. About five years will be required to complete construction of these features. Flaming Gorge Dam will be a concrete arch structure 490 ft high, 1,180 ft long at the crest and will have a volume of about 922,000 cu yd. The power plant, to be constructed at the toe of the dam, will have three 36,000-kw generators. Capacity of each turbine will be 50,000 hp. Work in progress consists mainly of constructing access roads and drilling the diversion tunnel.

• At the end of 1958, the initial contract for construction of the 48,000-kw Fremont Canyon power plant, on the Glendo Unit, near Alcova, Wyo., was about two-thirds completed. Invitations to bid on completion of construction of the plant are expected to be issued early this year. The completion work will include placing second-stage concrete for the plant, installing embedded and nonembedded parts for the two 24,000-kw generators and the two 33,500-hp turbines, and other hydraulic, mechanical and electrical machinery, equipment and accessories. The contract for furnishing and installing the two generators was awarded late in 1957, and was about 40% completed at the end of 1958. The plant is expected to go on the line in the spring of 1960.

Invitations are expected to be issued early this year for construction of a 142-mile, 115-kv, wood-pole transmission line to extend from the Kortes power plant to Cheyenne, Wyo. Bids are also to be invited early this year for construction of a 115-kv, wood-pole line running about 35 miles from the Boysen power plant 15 miles south of Thermopolis to Pilot Butte power plant, about 20 miles northwest of Riverton, Wyo.

Construction began in April on the 310-mile, 230-kv, steel-tower Fort Peck-Dawson County-Bismarck transmission line, a major transmission facility of the project. The line is to extend from the switchyard at Fort Peck power plant southward through the Dawson County substation near Glendive, Mont., and then eastward to Bismarck, N. D. It will transmit power generated by the Fort Peck power plant to project load centers in North and South Dakota. The line is scheduled to be completed in the fall of 1960.

Bonneville Power Administration

Review of '58

Customers	114
Power sales	29,330,000 mwh
System peak	4,900 mw
Capacity	7,000 mw
Construction	$23,400,000

Peak energy demand on the federal plants was 4,900,000 kw, Jan. 6, 1958, a decrease of 2.5% from the all-time peak of 5,024,000 kw occurring the previous November. New generator units added during the year had a total rated capacity of 579,250 kw.

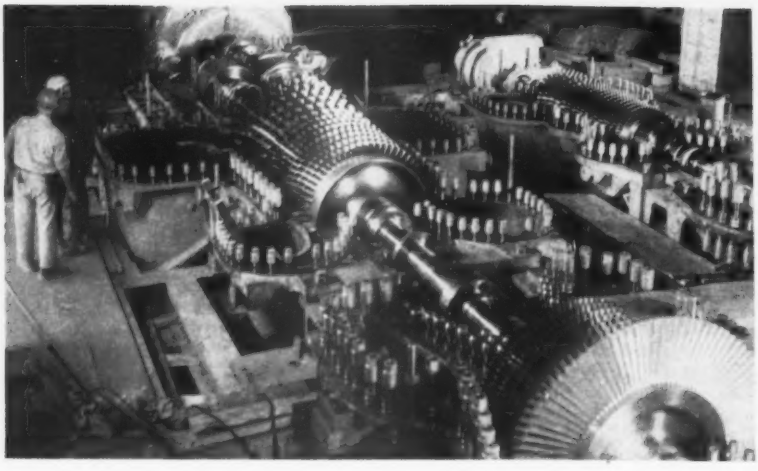
Revenue from the sale of power was $63,700,000 for 1958. Decreases

Status of Active Western REA-Financed Electric Systems

	Cumulative Construction 12-19-58	1958 Construction Loans	Miles Energized 10-1-58	Consumers Served 10-1-58
Alaska	$ 43,541,500	$15,078,000	1,547	16,720
Arizona	25,131,083	1,087,000	5,172	16,890
California	31,682,869	824,000	3,232	50,039
Colorado	119,217,740	4,176,000	32,408	79,374
Idaho	20,694,750	110,000	6,666	16,347
Montana	59,785,033	2,031,000	28,804	43,131
New Mexico	86,802,000	11,143,000	20,414	52,806
Nevada	482,704	130,000	165	793
Oregon	44,090,704	2,868,000	10,299	31,899
Utah	16,918,300	2,068,000	1,822	4,616
Washington	42,014,529	2,730,000	12,697	29,772
Wyoming	36,761,517	2,841,000	15,049	22,780

Number and Percentage of Electrified Farms in the Western States and the Per Cent of Those Farms Served by REA-Financed Systems

State	Number of Farms November 1954	Farms Receiving Central Station Electric Service June 30, 1958	Per Cent	Per Cent Served By REA Borrowers
Arizona	9,321	8,350	89.6	27.6
California	123,075	120,200	97.7	5.7
Colorado	40,749	36,500	89.6	60.2
Idaho	38,740	37,600	97.1	18.8
Montana	33,061	29,000	87.7	64.7
Nevada	2,857	2,300	80.5	13.3
New Mexico	21,070	17,850	84.7	63.8
Oregon	54,441	52,950	97.3	20.8
Utah	22,826	22,400	98.1	11.7
Washington	65,175	64,400	98.8	20.3
Wyoming	11,402	10,250	89.9	82.1
Total	422,717	401,800	95.1	25.9



B. C. Electric's first 25,000-kw gas turbine due to come on the line in February—Port Mann. Total capacity, 100,000 kw

from 1957 were 6.6% for generation and 5.1% for revenues. Primary reason for decreased BPA generation and sales was the cutback in sales to industrial plants.

Approval of the present budget before Congress would provide an estimated $21,800,000 in construction funds including $3,830,000 in contract construction for 1959. Transmission system additions during 1958 included completion of 285 circuit miles of high-voltage transmission line and 2,191,500 kva of transformer capacity including 1,200,000 kva of line transformation.

Major substation additions included 600,000 kva of line transformer capacity at Chief Joseph substation and 600,000 kva at Covington, with 350,000 kva at Snohomish substation.

Construction appropriations covering calendar year 1959 are scheduled to provide transmission facilities to meet the eventual addition of some 2,000,000 kw of combined federal and nonfederal capacity added to the present installed capacity of 7,000,000 kw.—**Wilbur P. Staats, information officer.**

Rural Electrification Administration

REA approved nearly $45,000,000 in loans to rural electrification borrowers in the 12 Western states, including Alaska, during calendar year 1958. The loans will enable the borrowers to provide electric service to an estimated 11,000 new rural consumers, add approximately 4,000 miles of line to their systems, add about 33,000 kw of generating capacity and make extensive system improvements.

The loan total was $5,300,000 more than was approved during the previous year, and brought to $527,000,000 the cumulative total of loans approved to active REA borrowers in this area. Loans to all borrowers total $534,000,000.

Loans made in 1958 were distributed as follows: Alaska, $15,078,000; Arizona, $1,087,000; California, $824,000; Colorado, $4,176,000; Idaho, $110,000; Montana, $2,031,000; Nevada, $130,000; New Mexico, $11,143,000; Oregon, $2,868,000; Utah, $2,068,000; Washington, $2,730,000; Wyoming, $2,841,000.

Active rural electric cooperatives, public power districts and other power distributors in the 12 Western states, which are using REA financing, were serving a total of some 365,000 consumers over more than 138,000 miles of line on Oct. 31, 1958. In addition, 19 former borrowers were providing service to 14,801 consumers over 3,923 miles of line by the time they had repaid their REA loans in full.

As of July 1, 1958, 95.1% of all the farms in these states were receiving central station electric service.

Power consumption on lines financed by REA continues to double every seven years. In the Western states, as throughout other sectors of the country, power suppliers are paying special attention to system improvements in order to meet this increasing demand. One loan to a power-type borrower was made during the year in the Western states. It amounted to $1,230,000 and was approved to the Colorado-Ute Electric Assn. of Montrose, Colo.

REA electric borrowers in the Western states have made a cumulative total of $108,994,833 in payments to the federal government on their loan obligations. This includes $59,879,117 repaid on principal, $33,797,851 paid in interest and $15,317,865 paid ahead of due dates.

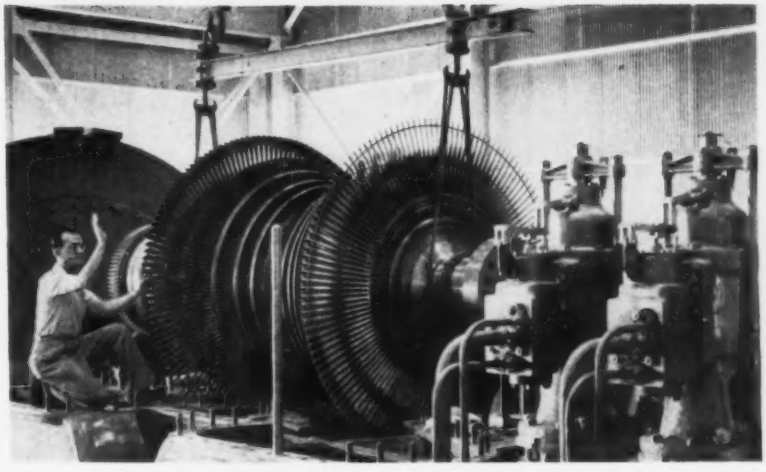
WESTERN CANADA—Utility Expenditures Continues at $100 Million Level

B. C. Electric

Despite a relatively quiet year, featuring extensive work stoppages from labor disputes and forest closures from prolonged dry weather, the energy output of the British Columbia Electric Mainland and Vancouver Island system increased by 6% over the twelve months. An indication of a return to normal conditions is the fact that the peak one-hour demand for the company system was over 750 mw, an increase of approximately 13% over last year's figure.

During 1958, a total of approximately $60,000,000 was spent in bringing new electrical plant into service and preparing for future facilities. During 1959 it is anticipated that some $79 million will be spent on new electrical plant. The installed generating capacity on the B.C. Electric system is now rated 744,700 kw and of this 47% is remotely controlled plant. This includes the 140,000-kw Cheakamus development consisting of two 70,000-kw units. Two plants totaling 64,000 kw of capacity are remotely controlled from the Bridge River No. 1 plant while the other remotely controlled plants, four in number, are operated from the company's load dispatch office.

Much of the work in 1958 involved the addition of new substations and preliminary work for the company's future system. The Clowhom plant, rated 30,000 kw, was brought into service in 1958. Work progressed on the Port Mann gas-turbine plant of which the first 25,000-kw generator is expected to be in service in February 1959 to be followed by the second unit of similar rating a month later. The complete four-unit installation totaling 100,000 kw will be completed by the autumn of 1959. Originally this installation had been



A low-pressure turbine rotor is installed in Calgary Power Co. Ltd.'s Wabamun steam plant

planned for 1958 but construction was tied up by labor disputes.

Work on the final stage of the Bridge River hydro development continued, with good progress on No. 2 power house, and work will continue during 1959 to the extent of some $22 million. This will provide for two units of 62,000 kw each for operation in 1959. With the completion of the lower storage dam, two more units of 62,000 kw each will be brought into service in 1960. Construction of this plant has involved the driving of a second tunnel through Mission Mountain west of the tunnel serving Bridge River No. 1 plant. The new tunnel is 12,500 ft in length and is horseshoe shaped with a height of 16.5 ft. Two penstocks, 4,500 ft in length each, serve two vertical impulse turbines. An additional benefit of the project will be a 20,000-kw increased rating of the Bridge River No. 1 plant due to an increase in effective head.

Work will be continued during 1959 on the Burrard steam-generating plant. This plant is designed for an ultimate capacity of six units each rated at 157,500 kw, the first unit of which is scheduled for service in 1961.

The only new transmission brought into service during the year, apart from small extensions for 60-kv substations, was the addition of a second submarine cable installation at 138,000 v to interconnect the Mainland system with the Vancouver Island system. The two circuits, each rated at 120,000 kva are made up of six single-phase cables and one spare cable, together with associated overhead lines.

In all, some 105 miles of transmission line will be brought into service in 1959 and of this, approximately six circuit miles will be 230 kv underground cable in the urban area adding to the 14 circuit miles installed in 1957.

Included in the substation work to be done in 1959 will be the E. N. Horsey substation on Vancouver Island which will have an ultimate capacity of three 50,000-kva transformers. In Vancouver, initial work will be done on a substation for residential service in the western part of the city. This substation, scheduled for completion in 1960, will have an ultimate capacity of two 42,000-kva transformers and will be served by two 60-kv underground circuits. The existing University substation will be converted to 60-kv operation and will be increased in capacity to 40,000 kva.—**J. H. Steede, vice-president and chief engineer.**

B. C. Power Commission

Completion of projects under way in 1959 will find the B. C. Power Commission's power supply position adequate for the time being, both on Vancouver Island and in the mainland areas served by the commission.

Power Commission generation planners say the prospects are reasonably promising for a large (1,000,000 hp) source of power for Vancouver Island in the Homathko River system 140 miles north of Vancouver, B. C. Engineering studies are also being carried out on the Clearwater River system, north of Kamloops, B. C., with a view to providing additional hydroelectric capacity for the southern and central interior areas of the province.

The Power Commission's calendar of new generation is made rather uncertain for these reasons:

1. Engineering reports (due in March) on development of the Upper Columbia and international negotiations on downstream benefits.

2. Possible joint provincial-federal government flood control development of the Fraser River system and the subsequent accruing power benefits.—**L. H. Whittaker, director of public information.**

Calgary Power

Review of '58

Customers	98,626
Power sales	1,570,000 mwh
System peak	345 mw
Capacity	384 mw
Construction	$9,000,000

In the 12-month period ending Nov. 30, 1958, Calgary Power Ltd. supplied 1,557 million kwh of electric energy, compared with 1,447 million kwh during the same 12-month period a year ago. This would indicate a growth of about 8% for the year 1958, which compares closely with the rate of growth in the corresponding period of 1957.

During 1958 a second 66,000-kw unit at the Wabamun steam plant, 42 miles west of Edmonton, was commissioned, bringing the total plant capacity to 132,000 kw.

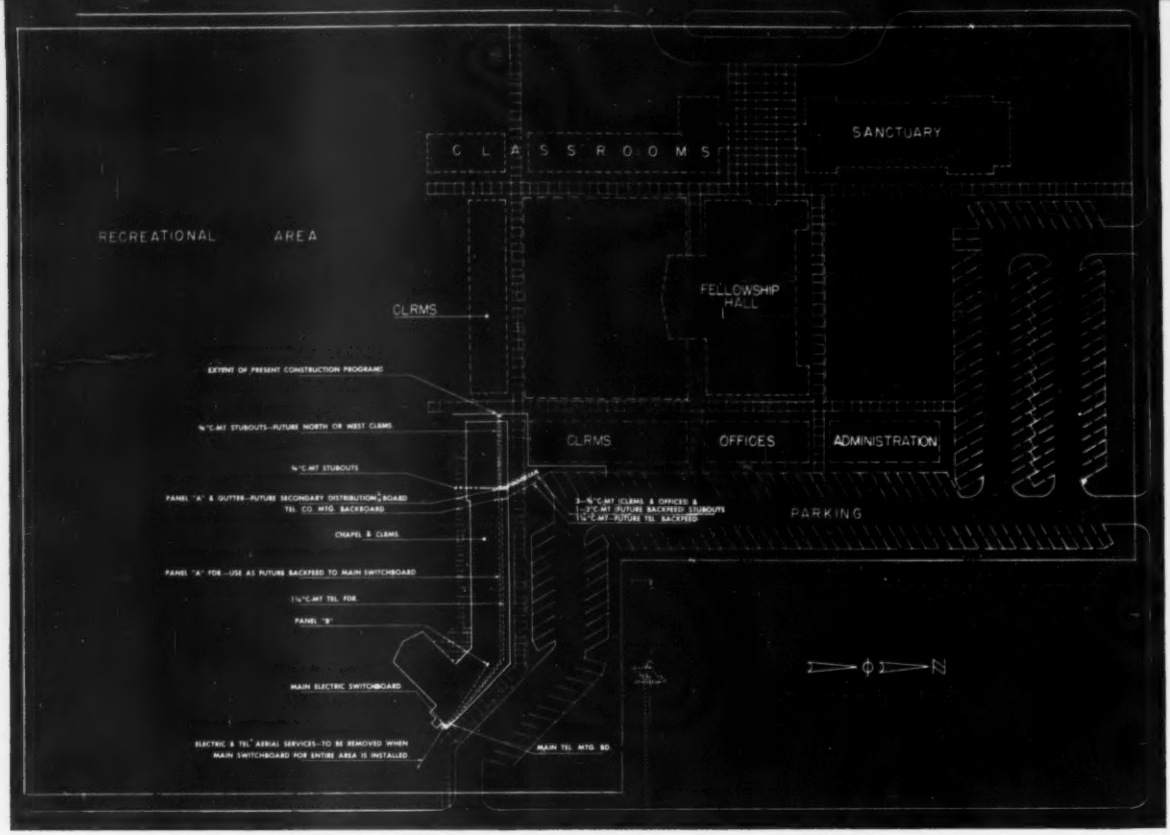
The company's 1959 construction program will amount to some $8,875,000, as compared with $8,521,000 in 1958.

Construction work will resume this spring on the Spray and Rundle hydro-plant extensions. These extensions will add 80,000 kw to the company's present capability of 409,000 kw. The Spray and Rundle plants are located some 60 miles west of Calgary and have a combined capacity of 67,000 kw.

Scheduled for completion in 1962 is a third unit of 150,000 kw capacity at the Wabamun steam plant.

To adequately meet the growing power needs of the company's customers throughout the province, potential thermal and hydro power sites are under investigation. Presently, investigations are being carried out on a hydro development on the Brazeau River, some 80 miles southwest of Edmonton.

As a matter of interest we would like to add that Calgary Power Ltd. is a member of Northwest Electric Light and Power Assn. whose head office is in Portland, Ore. General manager of the company, A. W. Howard, is a member of the board of directors for the association.—**W. E. Ross, director public relations.**



Solid line is first building; dotted lines indicate future buildings. Architect Alfred Johnson designed this church

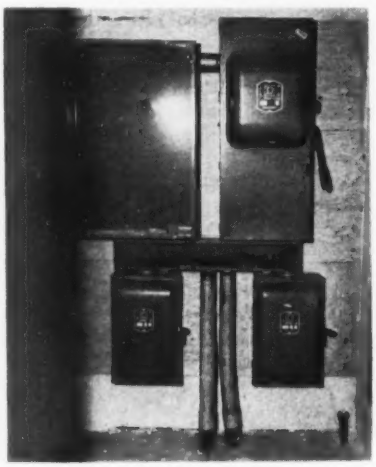
The Case of the Invisible Building

William P. Mazzetti, Electrical Engineer, Harold A. Wright Co., San Francisco

Satisfied customers are the best friends the electrical industry can have. The winning of these friends often begins on the consulting electrical engineer's drawing board — especially if the customer is constructing one building at a time in an over-all multibuilding project.

The electrical engineer, by carefully considering the buildings of the future while he is designing the initial electrical system for the first building or perhaps two buildings, can save the customer impressive amounts of money. When it is considered that most of these one-at-a-time projects are for church or school groups, dollar savings become even more important. It is true that the initial electrical contract will be somewhat higher because of extra conduit, extra capacity in switchboards and other provisions for the future, but it is also a fact that this additional expense is nearly always at least one-third less than the cost of revising the original electrical system as other buildings are added.

Many times planning ahead gives the customer the advantage of fixed charges or a one-meter rate by the time the entire project is completed. Conversely, a lack of planning for the entire project from the beginning may leave the customer with two or even three meters. Still another benefit is that the customer is getting more for his engineering service dollar, but not at the engineer's expense.



This is the temporary 400-amp main switchboard, oversized to handle future small classroom additions. The main switch will be moved later on as buildings are added

How does planning ahead affect the electrical contractor? First of all, the initial contract, as has been stated before, is somewhat larger. The major advantages, however, are long term in nature. The contractor who makes the first installation has the advantage of knowing what provisions for the future have been made. He maintains a contact with the customer through normal maintenance of the original electrical system, and the customer feels more secure as the acquaintanceship progresses. Quite often this results in a direct contract for the contractor when another stage of the project is to begin. Even if the contractor has to bid, he has the advantage of knowing what provisions for the future were made, and this can affect the bid materially. If he gets the contract, he will improve his customer

relations even more by keeping down time and inconvenience in the first building to a minimum because new stages of development were provided for in the original electrical design.

It is worth-while for the engineer to do this planning ahead. The somewhat larger initial contract compensates for the extra engineering required so there is no out-of-pocket loss. Perhaps the most important benefits come from improved relationships with the architect, customer and contractor because the engineer has provided an "extra" that each will appreciate. In every case future engineering is simplified.

Directly under Mazzetti's feet is buried a stubout that will later see service when a fellowship hall and other buildings are constructed in the orchard area seen in the background

How It's Done

To do the job properly, the electrical consultant must first consider the project as a complete entity. He must have a reasonably close approximation of the present and future connected and demand loads. He must also have close liaison with the serving utility in order to determine present and future points of service as the load grows.

Planning ahead is complicated by the fact that many times the customer will not know which one of several buildings will be in the second stage of construction, third stage, etc. For small initial installations (up to 60 to 75 kw), studies are essential to determine whether the main switchboard is to be in the initial building or whether the main board will be shifted to a new location as additions are made. An effort is made to get as close as possible to the point of service, and keeping the length of the large feeders as short as possible to affect materially the electrical contract.

A secondary switchboard located near one end of the present building is designed to serve the entire wing of the over-all building project, including both present and future. Mazzetti points to an idle 3-in. stubout that will later be used for backfeeding this secondary board from the future main switchboard. George Hewitt of Coast Electric Co., the electrical contractor, touches a number of stubouts for small classroom additions that might be constructed before the future main switchboard is installed

An important element in the "planning ahead" approach is providing capacity and availability (stubouts) for feeding small building additions that would not affect the location of the main switchboard. This is sometimes more difficult than it would appear on the surface because experience with multibuilding projects teaches that very often the future buildings will be placed in a location different from the original plan. Anticipating this, the consulting engineer must attempt to determine the firmness of the original plan by consultation with the architect and customer. When he finds that the plan might be subject to change, he attempts to set up the distribution system to handle the situation. Stubouts should be so arranged and sized that by backfeeding a secondary distribution point through an existing conduit, picking up stubouts, shifting a secondary board, etc., electrical service is available at the location eventually selected. Replacing or paralleling an existing raceway is an expensive proposition, and it is usually far better and more economical to oversize a number of raceways in the original installation.

Still another important element in the "plan ahead" approach, is an understanding of the maintenance problems of the owner. The electrical engineer should design for an over-all electrical system that is as simple and centralized as possible. The tendency for multibuilding projects is for the installation to be spread out over a large area of land. Careful consideration of this and subsequent attention to location of master switching stations for the control of lighting, heating, etc., can save maintenance men an impressive amount of time. The savings realized through the reduction of maintenance time will help pay for the additional facilities.

The Idea Must Be Sold

The idea of planning ahead for the invisible building is not often accepted without some degree of salesmanship on the part of the electrical engineer. The customer or the architect, or both, for the sake of long-range economies are going to be asked to make either an outright increase in the over-all budget or increase the electrical budget, possibly with the sacrifice of some building feature. The ideal "salesmanship" is for the electrical engineer to earn the full confidence of both client and architect by demonstrating that the particular job is his main concern and that he is doing everything possible to design an installation that is economical and yet capable of adjustment to the future load. Because the increased expense, however small it may be, is very real and the benefits are temporarily intangible, he must do his selling job well.

The invisible building is an interesting but shifty part of a multibuilding project. It can also be expensive. The important thing to remember is that it is cheaper and more desirable for the customer to lay extra conduit or oversize conduit than it is to tear up his original building. He will appreciate it at some time in the future.

Take Guesswork From Heat

(From Roscoe D. Carroll, Consultant, Utah Power & Light Co.)

Operator's job is easier with the new electric furnace at the Salt Lake City plant

ANOTHER new application in the ever-expanding use of electric heat is the electric furnace installed at the Union Assay Co. office, Salt Lake City. The furnace is used to process ore samples to determine the amount of valuable elements.

The method used by Union Assay has been gas fired brick furnaces. Long years of experience on the part of the operator were required for heat control and these men seldom failed. This, therefore, was not the reason for the change from gas to electricity in this operation. The actual reason was the economy of the electric over the gas furnace. The gas furnace required replacing the mufflers every three months and the tile work under them about every six months. This added up to nearly $250 per year. This cost, plus the other maintenance, became a large item to them.

In addition, the old operation was inconvenient because the furnace had either to be left on at low heat all night or started about 3 a. m. in order to be ready for operation at 8 a. m. The first method meant additional fuel cost and the other cost in man-hours.

Both have been completely eliminated. Additional cost for electricity is more than absorbed by the one maintenance item mentioned.

After this furnace was installed, other benefits were readily apparent. With the old furnace, smoke posed a definite housekeeping problem. Also, during the summer months, the radiated heat from the gas furnaces created temperatures that made working in their vicinity very uncomfortable. The electric furnace, being completely enclosed in steel, offers no dirt or dust problem and the electric heat creates no smoke. The furnace is insulated so that the working area is cool.

Sterilizes Cans

(From Fred Wemble, Power Engineer, PG and E, Stockton)

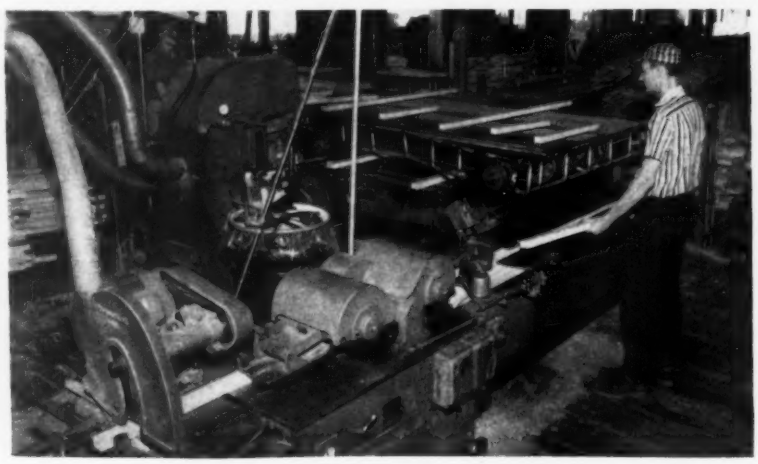
THE Thornton Cannery Co. of Thornton, Calif., has installed electric infrared ovens on each of its gallon-can lines to sterilize the cans before they are filled with hot tomato paste, apricots or peaches. Each oven is located adjacent to a filling machine and has four metal sheath units that heat the cans to approximately 200 F. The electric application replaces steam-heated ovens which gave off excessive heat and moisture to the surrounding area, adversely affecting the working conditions of cannery personnel.

1 Machine + 1 Man = 100% More

(From Allen Rudy, Industrial Consultant, Utah Power & Light Co.)

A Salt Lake City molding manufacturer more than doubled output by a modernization program that cut waste and man-hours, too. H. M. Draper & Sons recently added a finger jointer to their plant. With this machine they are able to conserve lumber normally wasted and turn it into acceptable stock for further processing. The machine takes lumber from which defects have been cut out, cuts the finger joint and glues the union under a pressure of 1,000 psi. Previously the joints were cut by a man running them through a jointer and then gluing and clamping the pieces by hand. This year the molding production will jump to 10,000,000 ft, compared to 3,000,000 to 4,000,000 ft previously.

It requires five men to run this new finger jointer but by adding another machine and one more man production can be increased another 100%.



Finger jointing machine provides dramatic illustration of productivity improvement possible through plant modernization

The Gentle Art of Counseling

Dr. William H. Pemberton, Consulting Psychologist, San Francisco

Postpone it as we may, the terrible day arrives when we must get across a message to an employee. An unpleasant message about inadequacy of work methods or habits.

So you find yourself confronting a basically good man who just happens to talk too much, or who hasn't learned to delegate, or has somehow become a bottleneck. It is natural to hope you can get a constructive message across, so that he can change.

And many times you take him through (what seems to you to be) a model interview—only to find that afterwards the man's methods and actions are unchanged, and your attempt at corrective counseling has only netted you an active resentment on the part of the employee. *Your failure to get the corrective message across occurred because—without realizing it—you put the man on the defensive.*

A man on the defensive could be a man with a personality disturbance, but most generally he is not. All of us get defensive occasionally and, when we do, we stop being logical. The moment the feeling of being on the defensive starts, constructive thinking and action stop.

Experts in psychology may be asking too much when they demand that busy executives become diagnosticians—that is, try to analyze, understand and cope with each and every personality reaction. But since a defensive person is oblivious to reason or good intentions, it is easy to see the value in learning the storm warnings associated with defensiveness. We would then know quickly if our interview would be interpreted as an unfair attack, whether the message was being received or not, and how well.

How Defensiveness Develops

Let us agree your intent is to help the man to improve. To do this, you find that you do have to point out directly that he has seriously handicapping shortcomings. The person instead interprets your attempt as an insult or as an attack. People who feel attacked or threatened develop marked defensive reactions. They move in one of three directions:

1. *Some of them clam up.* They have nothing to say in their own defense when they feel that the boss is attacking or criticizing unfairly. Some just remain moodily silent in the face of attack; others get sullen and implicitly resentful, giving the boss the passive resistance treatment. This has been called "hang-up" behavior—the switchboard operator in the mind simply disconnects unpleasant callers-in.

2. *Others attack back.* You thought you were being constructive, but in their eyes you attacked them so they attack right back. Some of these will tell you to your face how much they think you lack in the way of administrative skill. Others will give out with long editorial comment to their fellow employees at lunch or around the water cooler. This kind of behavior can damage the morale of the entire office. This type is the Monday-morning quarterback: they usually have a great deal to say about your business acumen—all bad.

At times this type will employ the advice-giving gambit. Knowing everything about everything, they can usually tell you all about what you must and ought to do. The strange thing is, nobody can tell them much of anything—they know it all.

3. *Another type is the deceiver*—the window-dressing type. These defend themselves by resorting to a variety of gimmicks, anything from the conventional alibi to the downright lie.

These fellows are usually quite bright and interested in looking well in the eyes of the boss. They have good analytic minds. In conferences they are quick to see the errors and place the blame. Somehow the blame always falls on everyone else's shoulders—never on theirs.

They are perpetually innocent, they are great buck passers. They also double as seers, they can see someone else's booboos even before he makes them.

Some of this type are the eternal apologizers quick to say "I'm sorry"—often when nothing discernible has happened for them to be sorry for. Another trick these fair deceivers like is the "agreeable Charlie" gambit. In this case the man yesses the boss to death, most often when he secretly resents and really disagrees with everything the boss is trying to say.

A widely practiced defense is the burlesque. In this case the man subtly changes the subject by making a joke out of the deeply serious problem the boss is trying to hammer out. Are any of these reactions familiar?

People employ the various defensive reactions when they are really trying to protect or enhance their own positions. What they succeed in doing is to make the situation worse.

Experts in the counseling and disciplinary arts, by experimenting, have found ways of keeping this kind of conversation on a casual level of information giving and getting.

The assumption of the counselor must be that most people eventually correct their own distortions of logic and errors of thinking, given a chance to do so in a constructive and tolerant atmosphere.

In such conversations, bosses feel it helps to ask men for their honest feelings about on-job relationships. Supervisors feel free to describe their own feelings about the situations, and they show an understanding of the feelings of others.

Mastery of skill of understanding—listening—was discussed by Dr. Phelan (Electrical West, March 1958, p 61). Keep interviews constructive.

If we can get off the defensive, we can use logical analysis. We adopt more constructive and cooperative attitudes, and find better ways to get the job done. Eventually we acquire more understanding of the people we work with, their assets and their limitations.

Learning to become a diagnostician and a therapist for deep personality problems should not be expected of a busy executive. He can, however, learn to recognize when he is putting his people on the defensive. He can learn to avoid it because it gets him nowhere. We can all learn to hold constructive conversations in which there is an exchange of facts and ideas, and through which we learn to solve our mutual problems together.

Misuse of Motors and Control—II

Accelerating the Load

Tom Hughes, Electrical Safety Engineer, California Department of Industrial Safety

If we are only going to start a motor once or twice during an eight-hour shift its over-all dimensions are not of much consequence. If, on the other hand, we are going to be starting and stopping or reversing at frequent intervals, the inertia of the rotor is a very important factor. The inertia derives from both the mass and diameter (radius of gyration).

Of course, in some cases, where the movement of the load is very erratic, inertia may be desired as a stabilizing factor. It was quite popular in the past to use the rotor of the motor as a flywheel but a lot of sad mistakes were made in this direction and the practice remains only where the motor is direct-coupled to a machine that runs at the same speed as the rotor.

Any other attempt to derive a benefit from the inertia of a rotor is a costly process because of torsion in shafts, backlash in gear trains, impact stress in belts, etc. So, we see that the inertia of our rotor in general is an undesirable factor, both from the standpoint of added load in frequent starting and stress on the connecting linkage.

In the past gears were crude, expensive, and difficult to lubricate, and trains of belts and countershafts took up a lot of room. So, when slow speeds were required, large, slow speed motors were considered desirable. Today, however, there is little excuse for the large slow speed motor except where it is to be on the same shaft as the load and will serve as a flywheel.

We stated that mistakes were made in the past and we are sorry to state that they are still being made in this matter of torsion in shafts. Either too many would-be designers didn't study physics or they didn't absorb much when they did.

When you have an erratic load, and especially one with impacts like a rock crusher, you must impose a flywheel or cushioning device between the load and the speed reducing linkage. Thus, if autos could have had a fluid drive coupling next to each rear wheel, the manufacture of drive and jack shafts wouldn't have been such a good business for the early decades of this century.

Then there is the matter of using a motor, inductively, as a braking or lowering device. Here, again, the nature of the load must be considered and a cushioning device may be advisable at the proper point to absorb impacts and protect the speed reducing linkage.

Today's popular unit hoists provide a good example for misapplication and twisting of shafts. The load is hoisted by a cable, wound around a hollow hoisting drum. Within the confines of this drum most designers provide what is called a "load-brake." This brake consists of engaging cones or disks actuated by some form of overrunning linkage. By overrunning we mean that in the lowering direction of rotation this device will automatically start to apply the brake when the cable drum starts to accelerate faster than the motor.

In this relatively small hoisting setup, the motor is just an ordinary squirrel cage type and is not used for any form of so-called "dynamic" lowering or braking. Since such hoists are a popular item and competition in the field is keen, a lot of people have designed such units and a lot of mistakes have been made by ignoring the matter of torsion in motor shafts.

If you use a big motor, you have a big rotor and great inertia. If you use a small, high speed motor you have to add more gears to your train (between the motor and the load brake) to come out with the same speed of travel at the hoist drum. So the problem of the inertia of the rotor is the same whether a large or small motor is used.

Naturally, when the juice is shut off and the load-brake automatically applied by its self-contained overrunning device, the kinetic energy residing in that turning rotor must expend itself in work against that brake. Whether you have a big rotor and less gears or a small rotor and more gears, the foot-pounds of energy working through the compounded leverage of your gear train is enormous. If the gears can stand it then the energy of your rotor is dissipated in trying to twist its own shaft in two. And, too often, such is accomplished after enough tries.

The answer, of course, is to use two brakes; one at each end of the speed reducing linkage. A solenoid brake is usually applied at the motor end and is often built into the motor itself. The solenoid is energized by paralleling one phase of the motor stator leads and uses a split winding. But many designers try to get by with one brake, either at the motor end or the hoist drum. This they can do if they build extra margin of safety into their shafts and gears. This, of course, does not apply to hoists of any size in California (where the General Industry Safety Orders require two automatic brakes).

This unit hoist is used as an example because most of us are familiar with such an application. But we have countless other applications where the inertia of a motor rotor is coupled to a load through a speed reducing train of gears or belts and its kinetic energy must be reckoned with in any erratic behavior of the load.

The simplest solution, today, is using the "fluid drive" coupling at the load end of the speed reducing linkage. This is all right where gravity is not a problem (as in the hoist load) or where the motor is not used inductively for retarding the load (dynamic retarding).

We talked to a man the other day who was designing a conveyor several hundred feet long and proposed to drive it by an identical motor and speed reducer at each end, to be controlled by the same starter. Everything sounded all right 'til he said that he was going to have one motor idle part of the time (turn off the juice) when the conveyor was not loaded. If he applies a magnetic clutch (or other automatic uncoupler) between the conveyor and the speed reducer there is no problem. Otherwise, he will be playing "crack-the-whip" with this inertia of his idling rotor on the receiving end.

Now, by this time, the average reader has asked himself, "What does an electrician care about the mechanics of correctly coupling a motor to its load?" And, of course he doesn't, except insofar as it affects the correct application of his electrical controls and protective devices. But the purpose of these articles is to show that all these factors enter in to the correct application of the controls, more than most people have been willing to recognize. When we come to the correct use of controls we will remember these factors.

(Next—Production of Heat in a Motor.)

ELECTRICAL WEST
Construction News

For
- contractors
- consulting engineers
- lighting engineers
- wiring designers
- distributor salesmen
- all interested

Plenty of work

Anticipated capital spending by industry in the West during 1959 should provide plenty of work for electrical contractors. Based on figures obtained from the McGraw-Hill Department of Economics, industrial plants will lay out over $1 billion for new or modernized facilities this year. Outside of the manufacturing field, mining, petroleum, utilities and commercial establishments expect to spend over $4 billion for a grand total for '59 of $5,798,000,000.

As negotiations started for 1959 there were indications that around the San Francisco Bay area unions would ask for eight paid holidays and another 25¢-an-hour increase on a one-year basis or 45¢ over a two-year period. The employer representatives on the joint labor-management committees comprising practically all of the Bay area territory were asking the unions to be more conservative. Both sides seem anxious to get along well and to arrive at a decision by Feb. 28.

So many bills that will affect subcontracting were being introduced into the California Legislature as it opened that the California Conference of NECA Chapters decided it must have a full-time lobbyist on hand to watch for its interests. The 11 chapters in California are prorating the expense.

"How to Insulate for Electric Heating" is a new 23-minute, full-color, sound-slide film available to contractor groups from Owens-Corning Fiberglas Corp. A 32-page brochure is also available condensing the subject matter of the film. Both would be excellent presales training for an electric heating campaign.

Dual service is now required in the city of Los Angeles by the Department of Water & Power for all new construction where residential air conditioning equipment is installed and the locked-rotor currents exceed 60 amp or the full load running currents exceed 16 amp at 240 v. Both services are totalized through a dual element meter. (fig. 1)

New minimum property standards of FHA greatly improve the wiring adequacy requirements. They simplify the calculation of service entrance capacity, giving a 20% allowance for future growth. Minimum circuits are increased by one and washing machine circuits are required. FHA has likewise made other simplifications to speed up FHA commitments and to make them more flexible where changes or additions in the design are requested by the customer.

Academy of Lighting Arts, after making a fine success of its capacity classes in San Francisco, Oakland, San Jose and San Rafael during the fall of 1958, is running a series of residential lighting seminars under sponsorship of Northern California Electrical Bureau. Meetings for architects and decorators will be held Jan. 15 and Feb. 26 in San Francisco and for store lighting sales in San

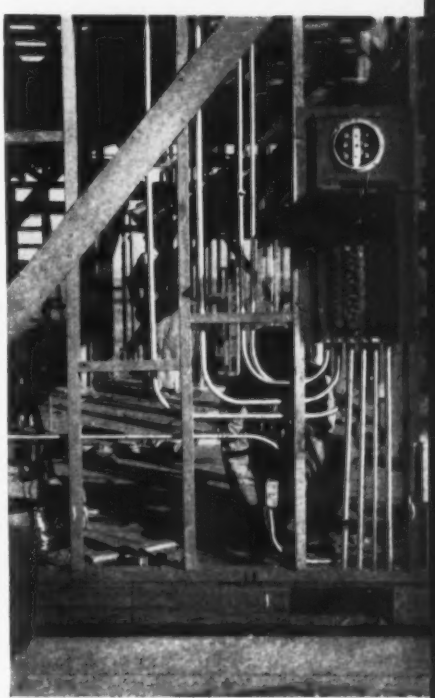


Fig. 1

Fig. 2

Mateo March 2 and April 13, San Jose March 3 and April 14, Oakland March 4 and April 15, San Francisco March 5 and April 16, Monterey April 20 and June 1, San Luis Obispo April 21 and June 2, Bakersfield April 23 and June 4, Fresno April 22 and June 3. The previous series had a total enrollment of 185.

San Francisco Contractors Assn. and its teammate, the new San Mateo Chapter, NECA, joined in the annual Christmas Party held at the Lake Merced Country Club in San Francisco. It was for members and their wives only and a departure from usual practice was that the prizes were cash given by both associations. Arrangements were in charge of William J. Varley, manager, and a large turnout was reported. In picture 2 he presents cash prize to Ed Kleinhaus, Kay Electric of San Francisco, a director of the association.

Feeling that electrical contractors are overlooking the potential in developing electric heat, the Foothill Division of Los Angeles Chapter, NECA, had Marty Cove of Montgomery Bros. address its members on "Heating and What It Can Do for the Electrical Contractor" at its Jan. 19 meeting.

An electrical code class began Jan. 8 in Hayward at the Adult and Technical School under the direction of Ernest Nelson, San Leandro chief electrical inspector. The classes were open to wiremen, contractors, estimators, inspectors and maintenance electricians and are held each Thursday evening.

Examinations for contractor licenses will soon be required in Utah, John H. Chase, administrator of the State Department of Contractors, is quoted as saying. Two types of tests will be required. One will measure the applicant's knowledge of his legal and financial responsibilities. The second will be a technical examination in the field for which the license is desired. Among these is electrical contracting. In the latter classification a test has been prepared by members of the industry and then checked on successful contractors for reliability.

Fig. 3

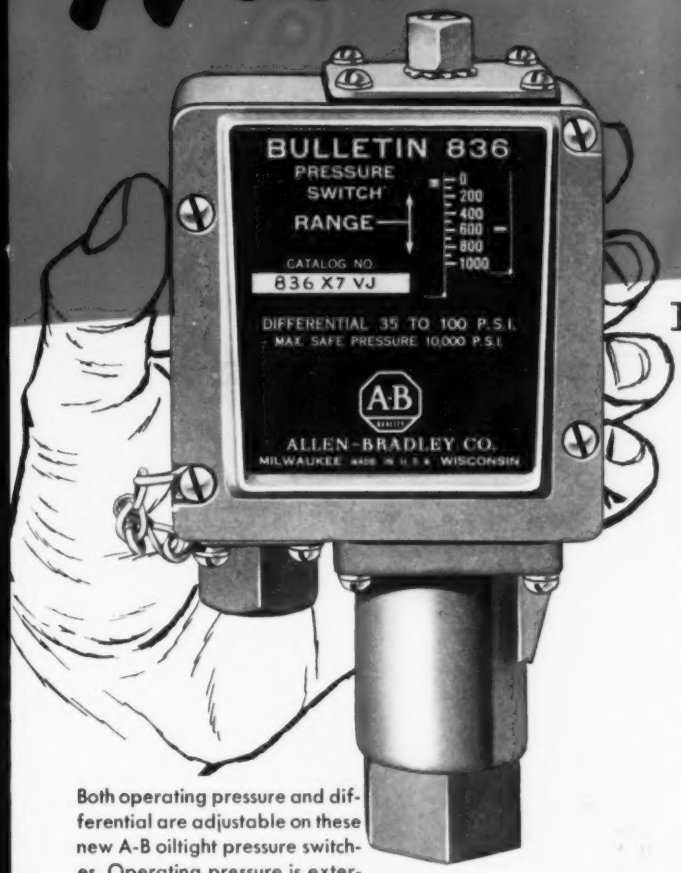
Ernest Nelson, San Leandro chief electrical inspector, was elected chairman of the Northern California Chapter, IAEI, at its Nov. 15 meeting in San Jose. Carl Tober, electrical inspector, Marin County, was named vice-chairman and Kennedy Bliss, Pacific Fire Rating Bureau, re-elected secretary-treasurer. Nelson succeeds Charles Viss, Modesto city electrical engineer. (Fig. 3)

Agreement on a new contract provided a 10¢-an-hour increase between IBEW Local 254 and the Association of Calgary Electrical Contractors in Canada. A further increase of 10¢ in May 1959 is included. Journeymen's scale will be $2.65 an hour.

"The Big Difference Is PLANNED PROFIT POWER." This is the title of a new booklet issued by the National Adequate Wiring Bureau to help electrical contractors, utility sales representatives and distributors obtain a greater share in the wiring modernization market of commercial establishments. Profusely illustrated with photographs of up-dated electrical facilities, the book includes 16 carefully compiled pages of of before-and-after case histories to prove that electrical modernization pays off. In lots of more than 100, the booklets cost 20¢ each and can be obtained from the bureau at 155 E. 44th St., New York 17, N.Y.

New ALLEN-BRADLEY OILTIGHT PRESSURE SWITCHES

Bulletin 836 Type T



Both operating pressure and differential are adjustable on these new A-B oiltight pressure switches. Operating pressure is externally adjustable, and setting shows on calibrated scale. A trip indicator shows operating point.

For machine tool hydraulic systems—operating at pressures up to 5,000 psi

Especially designed for heavy duty industrial applications, these new Allen-Bradley oiltight high pressure switches assure long, trouble free life. The attractive die-cast aluminum enclosure is completely sealed to exclude oil and water. The snap-action switch mechanism maintains its high contact pressure to the point of switchover—no matter how slowly it is approached. Contact chatter is eliminated—trouble free contact life is increased. The contact block has two isolated circuits with one N.O. and one N.C. set of contacts.

Send for complete information on this newest addition to Allen-Bradley's wide line of *quality* pilot controls.

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In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

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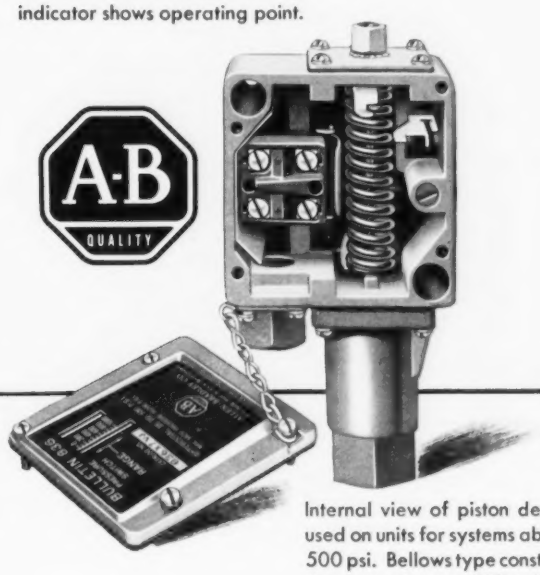
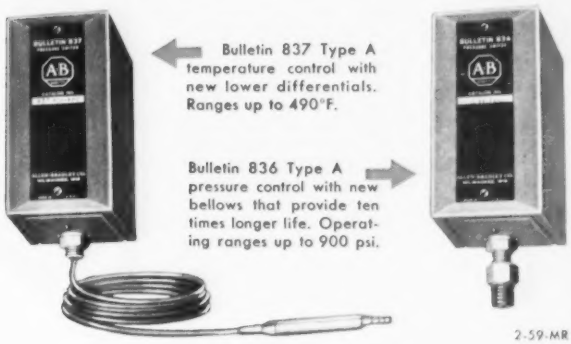
MOTOR CONTROL
QUALITY

A-B QUALITY



Internal view of piston design used on units for systems above 500 psi. Bellows type construction is used up to 500 psi.

Also...A New Line of Pressure and Temperature Controls with Lower Differentials



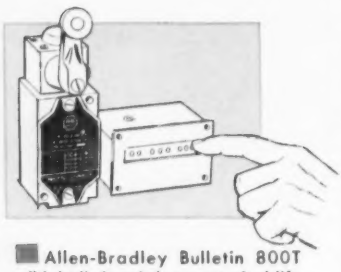
Bulletin 837 Type A temperature control with new lower differentials. Ranges up to 490°F.

Bulletin 836 Type A pressure control with new bellows that provide ten times longer life. Operating ranges up to 900 psi.

2-59-MR

Allen-Bradley is not satisfied until Limit Switch Life runs into

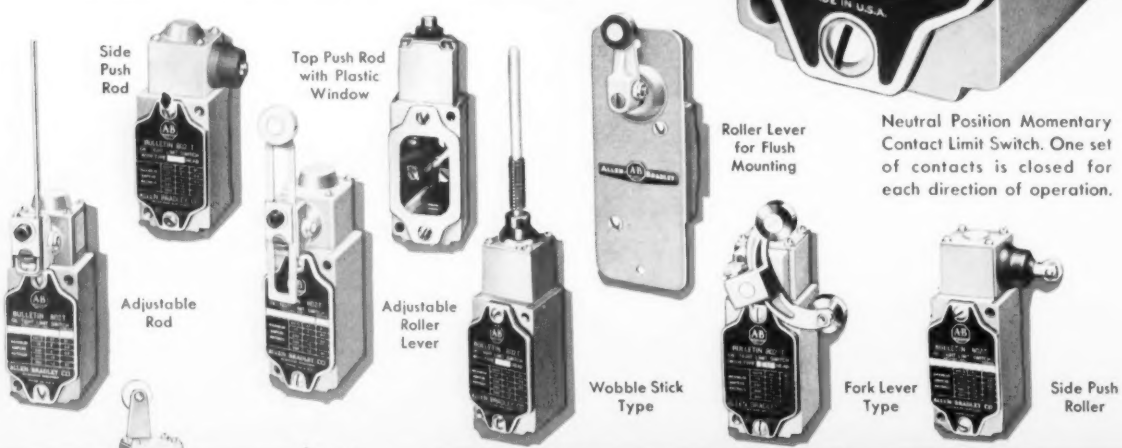
MANY MILLIONS OF OPERATIONS



Allen-Bradley Bulletin 800T oiltight limit switches on typical life tests have run many millions of operations. Write for complete information on the Allen-Bradley line of quality limit switches for every industrial application.

Here are some new—and some old—Allen-Bradley oiltight limit switches—all built to give you extra millions of trouble free operations. Their switch bodies and operating heads are both sealed. Oil, dirt, and metal chips cannot enter and foul the contacts or cause sluggish operation of the momentary contact mechanism. Double break, silver alloy contacts never need maintenance. The snap action switch is positive insurance against any reduction of the contact pressure as the "trip point" is approached. This means less chance for chatter and arcing of relays, contactors, or starters operated by the limit switch—and prolonged trouble free contact life for the limit switch itself.

The Allen-Bradley line of limit switches is complete. Illustrated are only a few variations.


Side Push Rod
Top Push Rod with Plastic Window
Roller Lever for Flush Mounting
Neutral Position Momentary Contact Limit Switch. One set of contacts is closed for each direction of operation.
Adjustable Rod
Adjustable Roller Lever
Wobble Stick Type
Fork Lever Type
Side Push Roller
Roller Lever for Manifold Mounting
Side Push Rod Maintained Contact

2-59-MR

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Association Affairs

Jim Barnes (right), regional vice-president of IES, presents Arrowhead Chapter charter to Chairman Gordon Burgess. Looking on: Ken Matsuoka, Dr. John Gorham, C. G. "Brownie" Dahlgren, members of board of managers. Program was at Golden Bull, Rialto

New IES Chapter Receives Charter

Arrowhead Chapter, San Bernardino, Calif., became number 84 on the IES membership rolls, with presentation of the official charter by Regional Vice-president Jim Barnes at a dinner meeting in Rialto.

Members and guests from all parts of the state, including an excellent representation from the parent Southern California Section, joined local dignitaries in the ceremony. Petition for the chapter was presented by Carlton M. Thompson, South Pacific Coast vice-president, at the executive council meeting in Toronto last August.

Gordon Burgess, the chapter's first chairman, received the gavel from Irwin McMath, chairman of the Yosemite Chapter, another new group, chartered Sept. 16 at Fresno. Other officers are: Jack Adams, vice-chairman; William F. Ritter Jr., secretary-treasurer; C. G. "Brownie" Dahlgren, Dr. John Gorham, Ken Matsuoka and Clyde Soden, board of managers.

The program included a talk by William P. "Teddy" Bear on organizational aspects and benefits of the IES and slides and description of the illumination at the Brussels Fair by J. S. Hamel, consulting engineer and a member of the board of managers of the Southern California Section.

► National Electrical Week will also be celebrated in British Columbia. Among the events scheduled is a luncheon at the Vancouver Hotel Feb. 11, at which W. I. Turner, president of the Canadian Electric Manufacturers Assn., will speak . . . Another event scheduled during that week is the 10th annual conference of the Electrical Inspectors Assn. of B. C. to be held at the Astor Hotel in Burnaby Feb. 12-14. (At a recent meeting attended by members of IAEI from Puget Sound Chapter W. L. Gaffney of Tacoma was presented an honorary membership in the British Columbia association.)

Elmer Kime, vice-president of operations for California Pacific Utilities Co., is shown as he receives a life membership to the Northwest Electric Light & Power Assn. from his boss, E. K. Albert, chairman of the board and president of Cal-Pacific

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SMALL DETAILS--but they ADD UP to better performance... easier maintenance for

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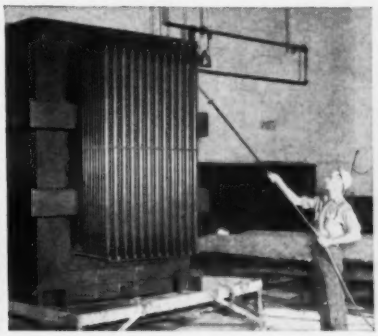
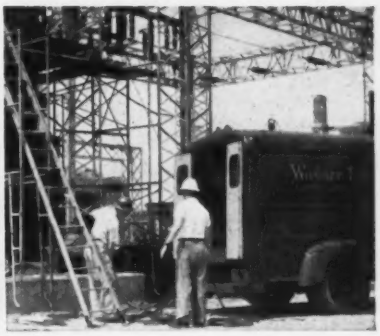


LONGER LASTING FINISH. New formula "Sure Seal" tank finish withstands all temperature changes—is much longer lasting in corrosive atmospheres.



FIELD REPAIR SERVICE. Wagner substation transformer service trucks, manned by expert field repairmen, are available on schedule.

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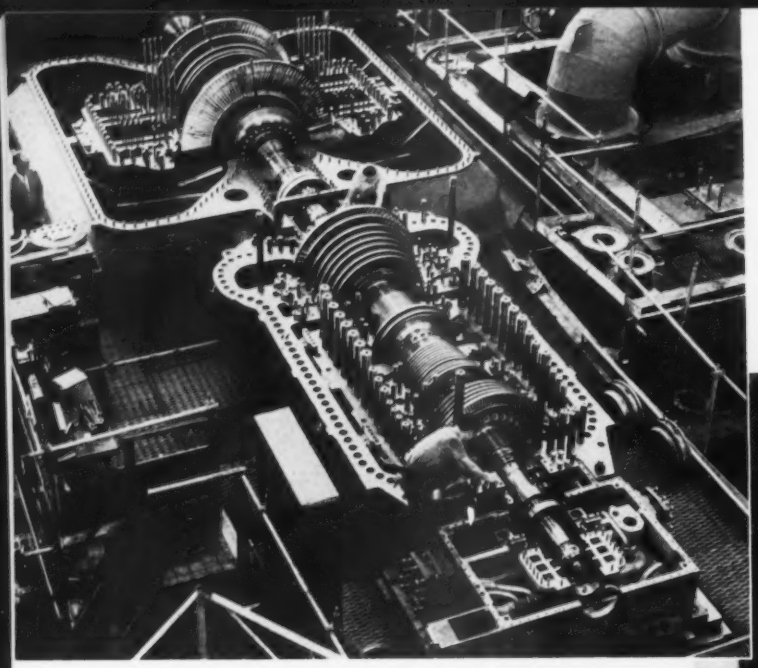
This single phase Wagner Transformer is rated 15,000 kva. High voltage: 23,000 Grd. Y/132,800 volts. Low voltage: 6900 Delta volts.

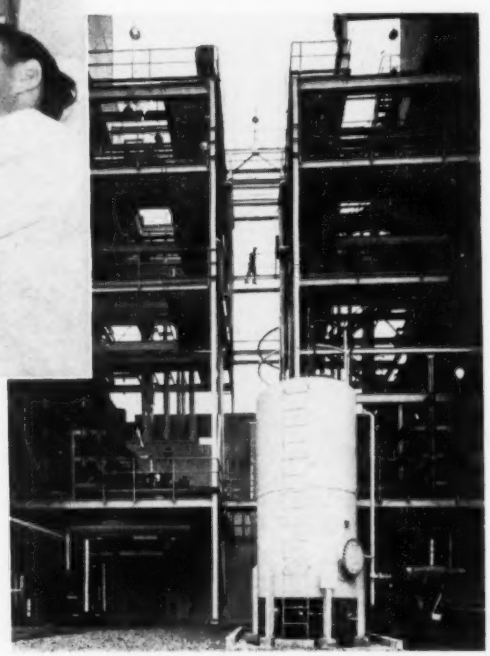
news



This 156,250-kw unit near completion in the Westinghouse Sunnyvale, Calif., plant is believed to be the biggest and most powerful steam turbine ever built in the West. It is the first of five such machines being manufactured at the plant for Japan. Teamed with generators being built in the East, each will produce enough power to meet average demands of 350,000 U. S. homes. When completed, the turbine will weigh 600,000 lb.

J. T. "Jack" Isbell received the plaudits of A. B. Chance's President Gano Chance at a "going-away" party given in his honor at the Villa Hotel in Hillsdale, Calif. The company's top executive group from Centralia, Mo., flew out to attend. (See People)

Nurse Betty Thacker helps patient Cleon Johnson try out electrically operated self-help cabinet at Boulder hospital. Claimed first in nation; the unit cuts cost, ups efficiency. (See Market Development)



This photograph would make Mr. Newton turn over in his grave. To all appearances, this steam-electric generating station attendant should be on his way to the ground. Actually, the man is walking on very strong Blaw-Knox electroforged grating used in the Humboldt Bay power plant of Pacific Gas and Electric Co. It is a trick of the sunlight that caused the twisted bar walkway to "disappear"

Management

PG and E and BPA Confer

Surplus power from the Columbia River system of Bonneville Power Administration may find a market in California. Executives of the Pacific Gas and Electric Co. and the Bonneville Power Administration conferred last month concerning the possibilities of utilizing the surplus runoff of the Columbia River during the high water summer season to displace steam generation on the California system. Even considering the long transmission circuits involved, the concept appears economically feasible.

Staff studies will proceed immediately. Bonneville power now may come as far as Klamath Falls, Ore., over a 230-kv circuit but additional transmission lines would be required to convey large blocks of energy into the northern end of the PG and E transmission network.

Foreign Bidders Enter Ring

The Los Angeles Department of Water & Power opened bids for two 200,000-kw, 2,000-lb turbogenerators with 1,000° reheat on Jan. 13. This time four overseas manufacturers competed with three domestic manufacturers with results that surprised no one. As usual the foreign offers were substantially below those of the U. S. companies.

Among the domestic bidders General Electric was low with a price of $7,378,965 per unit for a tandem compound design. On the same type of unit, the Swiss concern of Brown-Boveri submitted the low bid of $4,630,400. The three other foreign contenders were C. A. Parsons, Metropolitan Vickers, English Electric.

Also of note is the fact that all foreign bids were of a firm price while those from the domestic manufacturers provided for escalation up to 40% on the second machine. Delivery of the first unit was specified as being between November 1961 and February 1962 and of the second unit by December 1962. As this issue went to press there was no indication as to the action that would be taken in awarding the contract by the Department of Water & Power officials.

Start Glen Canyon Circuit

Utah Power & Light Co. has announced a formal bid to transmit energy from the big Glen Canyon Dam to its Utah customers. Although power allocations from the project, just over the line in Arizona, have not yet been determined, it is believed that 1959 will see important political steps among Upper Basin states and the United States Bureau of Reclamation in settlement of the power sales issue.

E. M. Naughton, president of UP&L, said that $1.8 million had been authorized to start the first leg of the transmission line, a 67-mile, 230,000-v circuit to be built from southern edge of UP&L system at Nephi, Utah, to a point just north of Richfield, Utah.

Construction will start Sept. 1, 1959, and be completed in May 1960, Mr. Naughton said. Before Glen Canyon power becomes available, the line will be energized from UP&L territory at 138,000 v.

Cowlitz Project Clouded

Despite the Supreme Court's green light for the city of Tacoma to proceed with its Cowlitz River hydroelectric projects, Washington sportsmen are still fighting a rear guard action. A new attempt to block the project is almost certain to be made in the current session of the state legislature as a result of petitions filed with the secretary of state containing over 110,000 signatures secured by the Washington State Sportsmen's Council. The petition asks the legislature to prohibit the construction of any dam more than 25 ft in height on any tributary of the Columbia River below McNary Dam. If 90,319 of the signatures prove to be valid, as is expected, the initiative automatically will be introduced in the legislative session. If the legislature fails to enact the measure, it automatically will go to the vote of the people at the next general election in 1960.

Meanwhile the consulting engineering firm of Ford Bacon & Davis of New York recommended immediate completion of the Mayfield Dam but postponement of the Mossyrock Dam on the Cowlitz for at least three years. The city has already spent nearly $11 million in preliminary work on the Mayfield project. Ultimate cost of the dam and power house with four 40,000-kw generators is estimated to be $44 million.

NEWS INDEX

Association Affairs	93
Management	97
Manufacturers—Distributors	114
Market Development	110
People	98

Utility Not Negligent

An Oregon circuit court has ruled in favor of California Oregon Power Co. in a suit in which the State of Oregon sought recovery of $40,682 it claimed was spent in fighting a forest fire started when a transmission line was broken by a falling tree.

Holding that Oregon law does not require owner of a right-of-way to fight fires which start or spread across the land, the court ruled that Copco was not negligent in the start of the blaze and that it was neither owner, operator or person in possession of the land where the fire started. Counsel for the state maintained the power firm had possession of the premises where the fire started and that it was its duty to clear the area of the right-of-way of trees adjacent to power lines. The state also claimed Copco was negligent in failing to fight the fire.

► Southern California Edison Co. will begin the construction of a 10-story office building in Long Beach, Calif., in mid-1959. The $4 million structure will serve as the hub for the company's largest single district.

Steam Plant Voted

By a vote of 114 to 13, acreage holders in the 105,000 Electrical District No. 3 of Pinal County, Ariz., approved a $19,300,000 bond issue with which to build a 66,000-kw generating station and acquire transmission lines in the area. The purpose of this move is to obtain cheaper power for agricultural pumping, which is now served by the Arizona Public Service Co. at 9.7 mills per kw at the pump. Executives of Arizona Public Service challenged the proposed figures upon which the issue was "sold" to the voters, stating that a more realistic figure for the steam plant's service costs would be nearly 11 mills.

The bond authorization obligates the land in the district for approximately $184 per acre, about half the cost of acreage in the district.

Appointments

Oregon's defeated Democratic governor, Robert D. Holmes, appointed the secretary of the Hells Canyon Development Assn. to finish out an unexpired term on the Oregon Water Resources Board. The new appointee, Byron C. Brinton of Baker, Ore., has opposed Snake River projects of the Idaho Power Co. in his weekly newspaper. The interim appointment ends Aug. 28, 1959.

Everett C. McKeage, chief counsel for the California Public Utilities Commission since 1944, will become a member of the commission at a salary of $19,500 a year.

Mitchell Doumit, Washington's assistant state attorney-general, was appointed Jan. 5 as the new manager of the Wahkiakum County PUD.

C. G. Hieber, a career employee of the Oregon Public Utilities Commission, was named PUC commissioner by Gov. Mark Hatfield. He succeeds Howard Morgan, Democrat, whose resignation became effective with Hatfield's inauguration Jan. 12.

Communication PUD?

The city council at Kennewick, Wash., passed a resolution calling on the Washington State legislature to pass legislation that would permit public ownership of telephone systems to be operated by existing public utility districts.

The resolution urged that such legislation permit PUDs to take over and operate private phone systems if the majority of the people in the district favor the move and to allow the formation of public communications districts in areas where there are no PUDs.

The move is viewed more as a threat than as an actual possibility, since Kennewick is one of several eastern Washington city governments that has voiced strong protests over a telephone rate increase proposed by General Telephone Co. of the Northwest.

Washing Rigs Fight Fire

About 100 Southern California Edison workers joined fire fighters in battling the Topanga Canyon fire which broke out New Year's eve and raged through the Los Angeles residential section for almost a week before being brought under control. In its wake the fire left 66 homes and 15 other structures destroyed and it blackened some 6,200 acres.

SoCal Edison lost 35 poles, 18 transformers and 20,000 ft of line, and experienced interruptions on five circuits as a result of the blaze. Still, the company's crews were able to maintain service, permitting the men on the fire line to make maximum use of their electrically operated fire pumps. The company pressed a number of insulator washing rigs into use as impromptu fire-fighting equipment and dispatched 20 mobile radio units to the scene to keep communications open to its own men and to relay messages to the firemen battling the blaze.

Wells Plans Started

The Douglas County PUD hopes to have plans for Wells Dam on the Columbia River completed in time for bidding and financing late this year. Preliminary plans call for a 400,000-kw hydroelectric plant at Aswell, upstream from the Rocky Reach Dam now under construction by the Chelan County PUD of Wenatchee.

► Owen W. Hurd, managing director of the Washington Public Power Supply System, reports that studies are in process on a proposed 60,000-kw hydroelectric project on the Hoh River on Washington's Olympic Peninsula. The project as now proposed calls for a dam 200 ft high at a site approximately 12 miles south of Forks, Wash. The Hoh River, rising in the rain forest of Olympic National Park, reaches its peak flow during the same months when power demand reaches its peak. Transmission lines in the project would extend to Port Angeles to integrate with the system of BPA.

People

► **R. G. "Spike" Kenyon** retired Dec. 31 as vice-president of Southern California Edison Co., ending more than 41 years of service with the company. He began his career with Edison in the accounting department, was named advertising manager in 1932, and assistant vice-president in 1942. He had held the post of vice-president since 1945. An active leader in many organizations, he was at various times a director of the Public Utilities Advertising Assn., the National Association of Electric Companies, the Pacific Coast Electrical Assn., and Merchants and Manufacturers. He had served as president of both the Los Angeles Electric Club and the Los Angeles Advertising Club.

Kenyon

Two Promoted

Two industrial sales engineers have been given promotions by Seattle City Light, in a move to strengthen its program for promoting industrial development.

Joseph P. Recchi, an industrial sales engineer since 1953, becomes supervisor of the industrial sales section in the commercial division. Arthur F. Turner, an industrial sales engineer since 1945, becomes industrial development manager, which is a new position.

► **Gail B. Rathbun** has been appointed engineering manager for electrical products at Westinghouse Electric Corp.'s Sunnyvale Division. He succeeds **Joseph H. Cox,** who retired Jan. 1. Rathbun has spent his entire professional career with Westinghouse. Cox, who is an AIEE Fellow, also served with Westinghouse throughout his professional career. During World War II, he helped to engineer vital vacuum and leak detecting apparatus for the atomic bomb project. Earlier, he pioneered in the field of lightning research and

Rathbun

Here's dramatic proof: Contracts have been let for new production facilities to meet your increasing demand for Republic ELECTRUNITE® Electrical Metallic Tubing.

Republic is building production capacity for the future. On your future jobs, use Republic ELECTRUNITE E.M.T. or Rigid Steel Conduit, as well as plastic armored raceways.

Because . . . the *best* costs *less* installed.

ELECTRICITY builds---JOBS...

REPUBLIC ELECTRUNITE E.M.T.

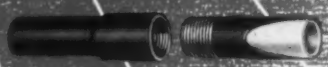
Brand new on the job benefit builder . . . Republic ELECTRUNITE E.M.T. with exclusive SILVERSLICK metallic finish makes wire-pulling up to 37% easier. Wire protects it, too. This new product improvement, combined with ELECTRUNITE's exclusive "INCH-MARKS" for easier measuring, and "GUIDELINES" for easier bending are all reasons why . . . the best low cost item has installed.

"DEKORON-COATED" E.M.T.

"Dekoron"-Coated E.M.T., the plastic armored raceway recommended for use in severely corrosive conditions of service outlasts standard conduit 10 to 1. Easy to install, requires no special tools, no special fittings.

GALVITE RIGID STEEL CONDUIT

GALVITE® (Blue Label) heavy wall galvanized conduit has a special coat of baked-on lacquer inside and out for corrosion-resistance and long life.

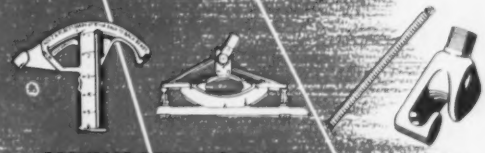


"DEKORON-COATED" RIGID STEEL CONDUIT

"Dekoron-Coated" Galvite Rigid Steel Conduit—the heavy wall raceway that shrugs off corrosion. Tough coating of polyethylene encases the conduit, inside and out, armor for protection against severe corrosion.

ENAMELITE RIGID STEEL CONDUIT

ENAMELITE® (Red Label) heavy wall conduit is protected inside and out with a baked-on coating of tough, vitreous enamel for greater protection against moderate corrosive action.



REPUBLIC BENDING TOOLS

Republic Bending Tools are designed and engineered to help the contractor make accurate predetermined bends in Republic raceway installations. Avoid costly "wows", wasted time, and wasted material.

NATIONAL ELECTRICAL WEEK

FEBRUARY 8-14, 1959

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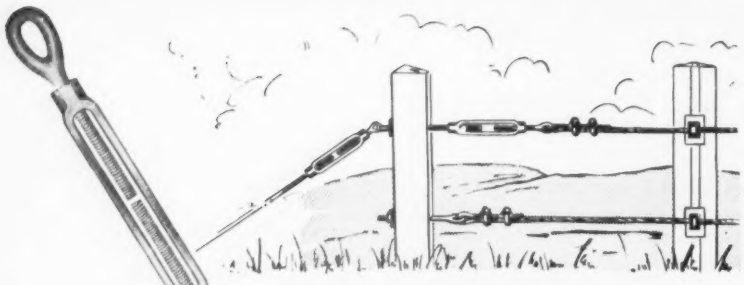

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STEEL AND ALUMINUM
BTC STRAIN CLAMPS

Continuous power path—Uncut Jumper Loop
Easy and economical to install—no special tools
Efficient, dependable dead-ending for all conductors
Wide range of sizes
Specify the best—BTC Hi-Line Hardware

THE BREWER-TITCHENER CORPORATION
HI-LINE HARDWARE DIVISION • CORTLAND, N.Y.

mercury arc rectifier engineering. He was responsible for the development and design of the Ignitron rectifier, which changes alternating current to direct-current electricity.

Redman

Church

► **Arthur D. Church,** manager of the San Joaquin division of Pacific Gas and Electric Co., retired Dec. 31. He will be succeeded by **Vern C. Redman,** who has been active in the San Joaquin Valley in promoting industrial development. Redman joined San Joaquin Light & Power Corp. in 1926 after attending Fresno State College, and advanced through the electric and sales departments. He became division manager of commercial sales in 1950 and assistant division manager in 1956. Church began his utility career with the same company at Bakersfield in 1914. He has served in the San Francisco general office, as Stockton division manager, North Bay division manager, and returned to Fresno as manager in 1953.

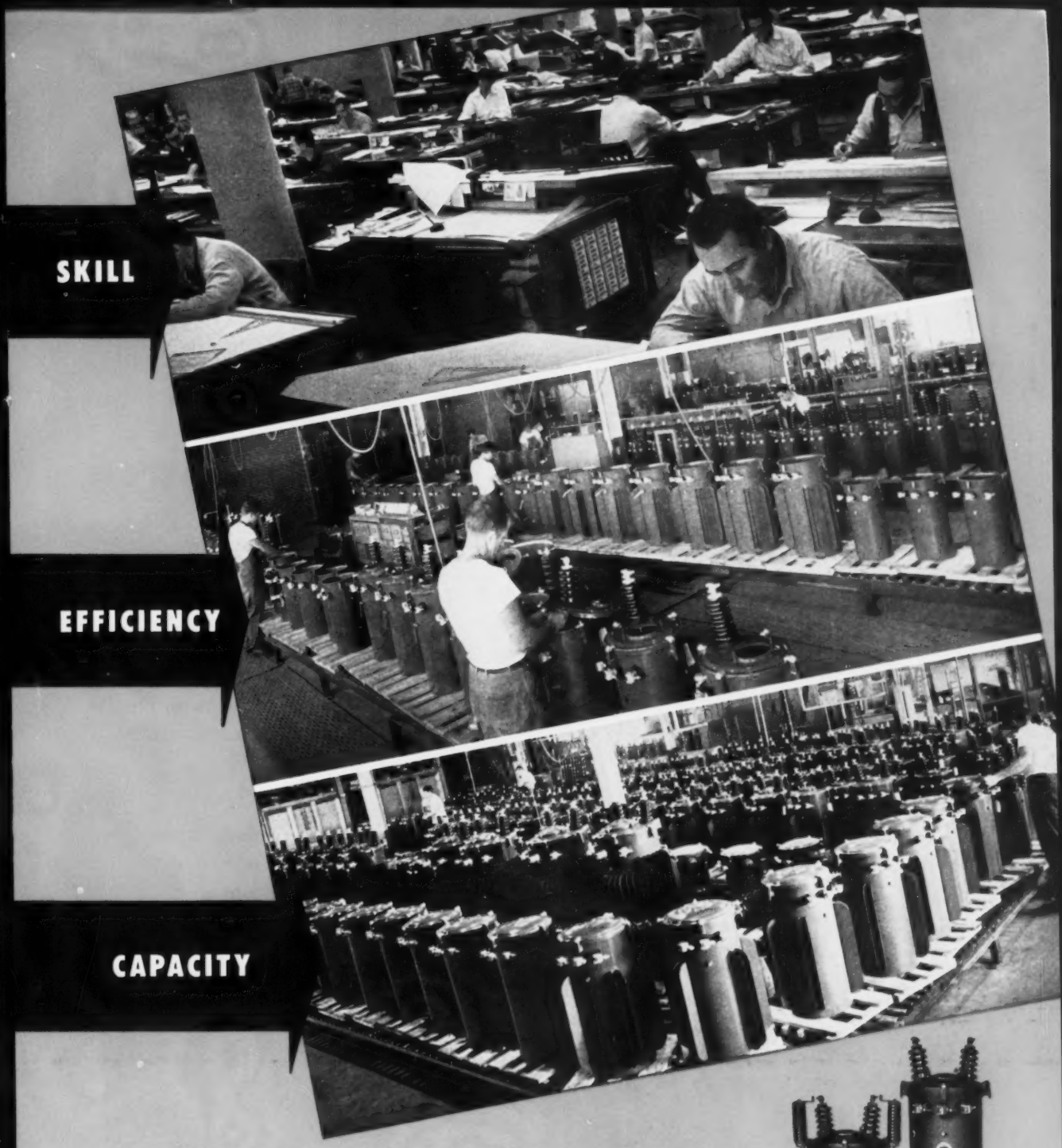
Four Promoted

Four promotions in the accounting department of Montana Power Co. were announced in early January.

John A. Chesarek was named chief accountant, Dudley B. Gibson and Henry E. Hoellein are assistant chief accountants, and Joseph R. Rosetti is tax accountant. All are natives of Montana, and employees with many years of service with the company.

► **Robert L. Kempton** has been appointed director of marketing for Edwards Co. Inc. He had formerly been general sales manager. Kempton joined Edwards in Chicago in 1940 as a salesman, and was appointed Chicago district manager six years later. Following this, he was transferred to San Francisco, where he established a new branch sales office.

Kempton



Provide Moloney Distribution Transformers in the Quantities You Require

Modern, highly mechanized production methods give Moloney the ability to provide any quantity of transformers needed to fulfill your requirements.

These efficient production methods, together with skillful design and adequate quality control procedures, guarantee that Moloney Transformers will be of the highest quality.

Specify the transformers that are designed, built and tested for efficient, dependable performance under all operating conditions . . . Specify Moloney Transformers . . . All Along the Line.

ME 59-25

MOLONEY ELECTRIC COMPANY

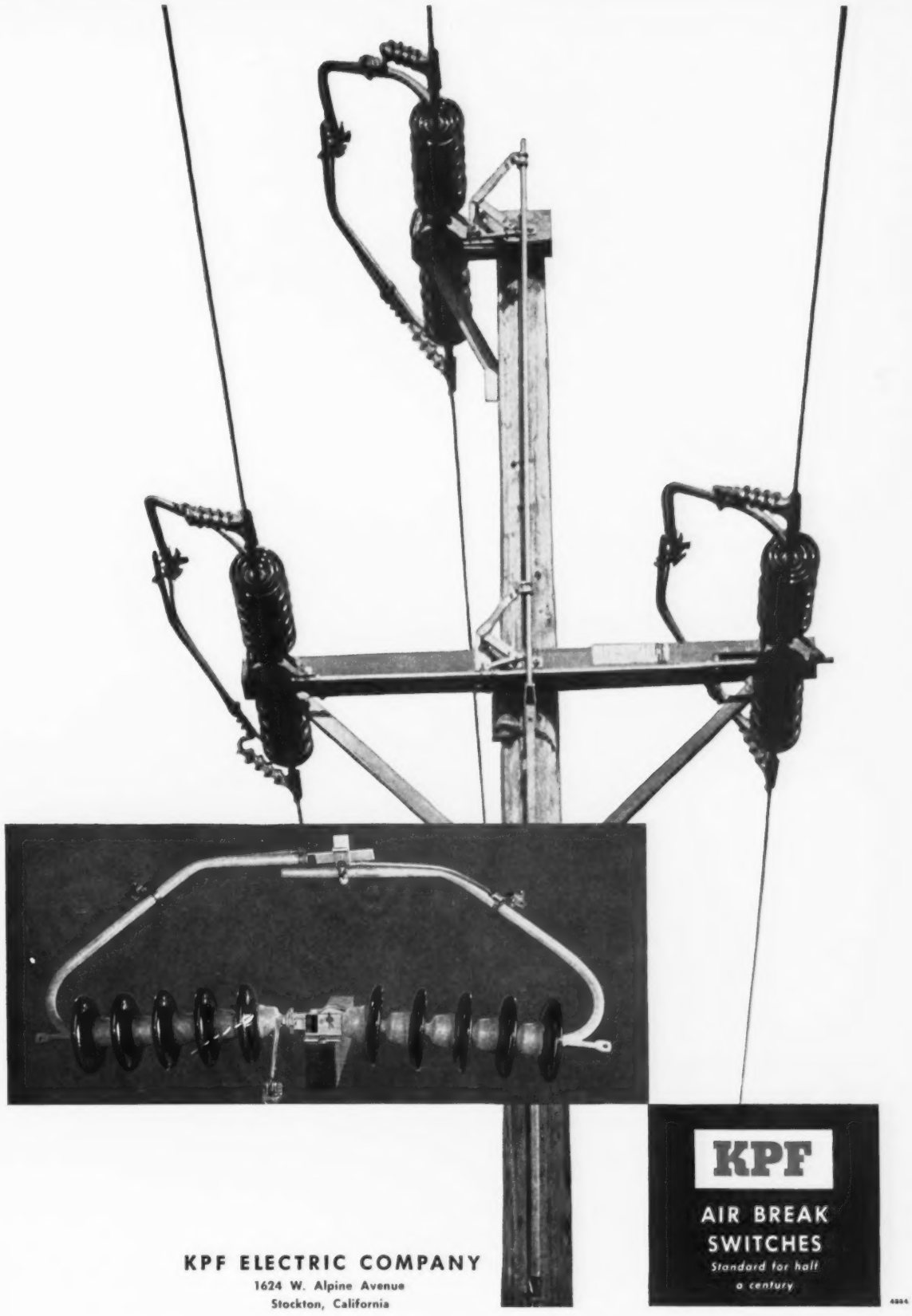
Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA

This look on a pole means KPF

No other air break switches look like KPF, or perform like KPF. The simple, functional design of KPF switches produces a clean pole top appearance. It also insures operating dependability in all weather. There are no delicate, complex mechanisms to freeze, lock, need lubrication or wear out. The light weight of rugged KPF switches means that no extra mounting structures are required.

Lower cost KPF switches have proved their advantages in over 50 years of service on major utilities. Make a test installation this month on your own system.


KPF
AIR BREAK
SWITCHES
Standard for half
a century
KPF ELECTRIC COMPANY
1624 W. Alpine Avenue
Stockton, California

MEN!

SPLICE CAPS AND TERMEND® LUGS
in new smaller quantity
SLIP-TOP BOXES*

You will benefit from these outstanding advantages . .

HANDIER—just shake out fittings as needed; also eliminate counting out from larger packages.

MORE ECONOMICAL—eliminate spilling and other on-the-job wastage; simplify orders and inventories.

LESS INVESTMENT—buy or put out on the job only required number of packages of 50 or 100*.

TERMEND Lugs
(For 1 #16 thru 1 #8)
Splice Caps
(For 2 #18 thru 3 #8 or 2 #6)
Nylon Insulators
Install with C24 pres-SURE-tool
Just snap on!

*Small Splice Caps and Insulators 100/box; large Splice Caps, large Insulators and Termend lugs—50/box. (Insulators are packed in regular boxes.)

Dispenses Fittings as needed

NOW IN STOCK AT YOUR ELECTRICAL DISTRIBUTOR

Write for Bulletin W-2

* *An exclusive development of BUCHANAN*

BUCHANAN
ELECTRICAL PRODUCTS CORPORATION
HILLSIDE, N. J.

Represented by
FRED A. PEASE CO. — DENVER, COLO.
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FRANK ROZEMA — COSTA MESA, CALIF.
ALLIED INDUSTRIES — LOS ANGELES, CALIF.
F. M. NICHOLS CO. — SAN FRANCISCO, CALIF.

He was appointed assistant sales manager for the company in 1954, assistant general sales manager one year later, and general sales manager in 1957.

Black Hills Promotions

Advancements in personnel of the Black Hills Power & Light Co. include the promotion of M. J. Westberg, former merchandise sales manager, to the new position of general sales manager.

C. Don Alexander, sales promotion manager, was named administrative assistant. Harry L. Edwards, former manager at Newcastle, Wyo., succeeds Alexander. Everett F. Pompy, who has been manager at Spearfish, S. D., succeeds Edwards at Newcastle. Karl A. Meier, a lighting specialist at Rapid City, was named manager at Spearfish.

Westberg has been with the company since April 1945.

► **John J. O'Ryan** has been appointed manager of the Denver district office of I-T-E Circuit Breaker Co. He replaces **Ralph G. Lockett,** who is retiring. O'Ryan was a sales engineer for the past five years with Young Electric Co., Denver, a switchboard builder. Lockett, a well-known figure in the electrical field, also served as manager of I-T-E's 11-state Western sales region.

O'Ryan

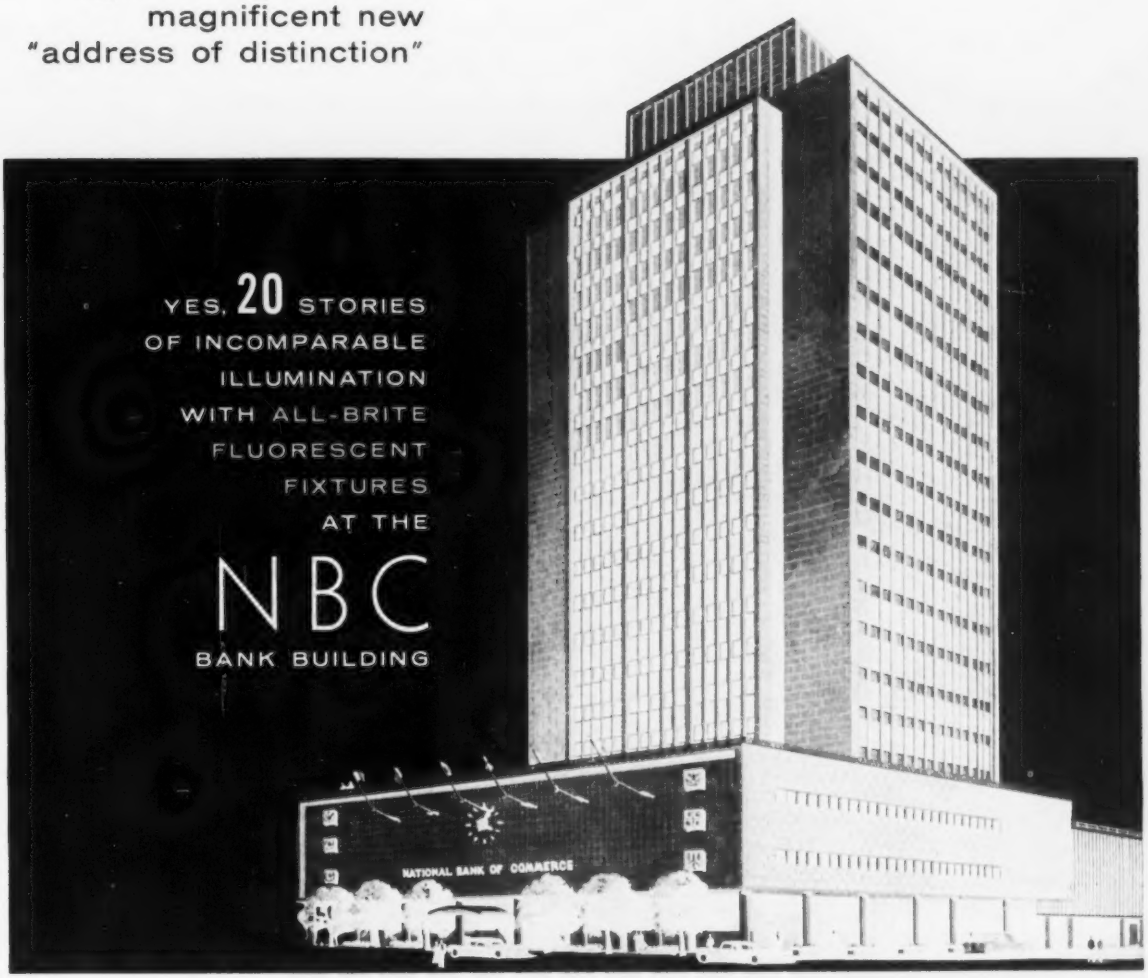
► **A. J. Noia** is now manager of personnel relations for Pacific Gas and Electric Co. Appointed to the position of manager of industrial relations is **R. J. Tilson.**

► **Randolph W. Englund** has been assigned as a sales representative to the San Francisco district of Allis-Chalmers industries group. He had been an application engineer in the company's electrical application department since 1956.

► **George H. Conner** is now Berkeley manager for Pacific Gas and Electric Co. Conner, formerly district commercial manager of the company in Oakland, succeeds Henry Lenninger, who retired Dec. 31.

► **Ora Fleischer** is the new representative for Day-Brite lighting fixtures in the Colorado area. He head-

ALL-BRITE
lights San Antonio's
magnificent new
"address of distinction"



Architect: Kenneth Franzheim, Houston. Associate architects: Atlee B. and Robert M. Ayres, San Antonio. Electrical contractor: Paul Wright Electrical Co., San Antonio. Consulting electrical engineer: Dale S. Cooper, Houston.

NEARLY 2000 PEOPLE WORK BETTER, FEEL BETTER, SEE BETTER

All-Brite Constellaire fixtures, installed thruout the new National Bank of Commerce Building, feature LIGHT-STABILIZED injection-molded polystyrene plastic louvers. Result: comfortable 45° shielding combined with beautiful design.

All-Brite
LIGHT OF AMERICAN COMMERCE

how can we help with YOUR lighting problems? Please ask for catalog.

ALL-BRITE FLUORESCENT FIXTURES, INC.
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PLANTS ALSO IN LOS ANGELES, SEATTLE, AND VANCOUVER, B. C.
REPRESENTATIVES THRUOUT THE UNITED STATES AND CANADA

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.....pole setting in inaccessible areas
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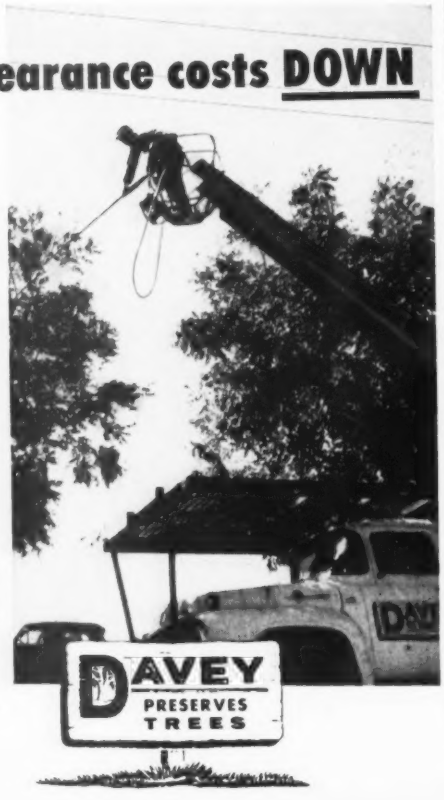
Keeping line clearance costs DOWN goodwill UP

Proven power equipment and Davey trained rope climbers... that's what makes Davey Surgical Line Clearance so economical. Utilities can rely on the dependable, efficient, and *adaptable* Davey crew. It will pay you to talk over your tree maintenance problems with the West's leading line clearing specialists—Call Davey.



DAVEY
TREE SURGERY CO., LTD.
OF CALIFORNIA

SAN FRANCISCO • Russ Building
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quarters in Denver. He was formerly with a firm representing Day-Brite in the St. Louis area.

Isbell

Argo

Executives in New Posts

Dwight E. Argo, Western sales manager for A. B. Chance Co., becomes vice-president and manager of the Western region on retirement of J. T. Isbell.

Isbell had served the company for 32 years, most recently as assistant to the president and head of Western operations. Retirement from this post does not stop his active career. Announcement was made last month by Petersen Engineering Co. of Santa Clara, Calif., that Isbell had been appointed vice-president of that company. He will concern himself mainly with customer relations.

Argo was moved to San Francisco in the fall of 1957. Previously he had been Southwest regional manager for Chance, with headquarters in Dallas.

► **Ove G. Sorley** has been named superintendent of British Columbia Electric Co. generating stations in the Fraser Valley area. He succeeds **William J. Henshaw,** who retired Dec. 31 after 50 years service with BCE. In the new position, Sorley will direct operations of plants at Alouette, Stave Falls, Ruskin and Wahleach.

► **Beverly A. Travis** of B. A. Travis & Associates, Seattle, has been selected "Electrical Man of the Year" by Puget Sound Electric League. He is a past president of the league, and is regional vice-president of the Illuminating Engineering Society. He is also a member of the daylighting committee for the Puget Sound Chapter of IES, and was recently named electrical engineer for the 1961 Century 21 Exposition to be held in Seattle.

► **George E. Freck,** Portland business and civic leader, has joined Pacific Power & Light Co. as administrative assistant to **Roy Vernstrom,** assistant general manager.

PUT FULL HOUSEPOWER TO WORK

No Venting To Get In The Way Of Sales

Dryer sales mean an average of 750 KWHR a year to you—and can boost a household's load factor an average of 4% a year. To stimulate sales of this revenue-building, profit-producing appliance, Hotpoint offers 100% Vent-Free Drying—a Hotpoint "first" designed to close the gap between dryer and washer sales.

Clothes are dried in a sealed chamber—lint and moisture are washed down the drain by a cold water spray. There is no venting, and no lost sales because of venting costs. Display and promote 100% Vent-Free Hotpoint dryers for greater earnings in 1959.

Model LC970

100% VENT-FREE

No need for costly, unsightly ductwork...your customers can save $15 to $30 on installation

All-New 3-Cycle Drying Adds Extra Salespower To Hotpoint Dryers

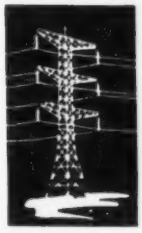
The new 3-cycle Hotpoint dryer combines true automaticity and complete flexibility to give *all* fabrics the specialized care they need. And, because the homemaker can use the Hotpoint 3-cycle dryer for *all* fabrics, you enjoy extra load and revenue.

CLOTHES MINDER CYCLE for regular fabrics—"measures" moisture, turns off dryer when clothes are dry.

DRY 'N WEAR CYCLE dries "wash-and-wears" without wrinkles.

SELECT-O-TIME CYCLE dries special items. Includes **TUMBLE ONLY**.

LIVE BETTER ELECTRICALLY



LOOK FOR THAT **Hotpoint** DIFFERENCE

A Division of General Electric Company, Chicago 44,

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THERE IS A DIFFERENCE IN ACSR

...and that difference is cable experience!

There is a priceless ingredient in Anaconda ACSR – *cable experience!* More than 50 years' work with transmission cable of all types. Designing, testing, manufacturing. Field consultations on hundreds of complex jobs.

You'll find Anaconda's cable experience shows up in many ways: longer trouble-free performance by the cable itself, practical suggestions by Anaconda's field engineers that may save you time and money.

So–before you start your next job–it will pay you to talk to the Man from Anaconda.

Backed by the broadest line of wire and cable in the industry, in both copper and aluminum, he is qualified to help you arrive at the most practical and economical answer to your cable needs.

Multi-mill manufacturing facilities – strategically located across the country – assure speedy service. Write or call today! Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

Pictured at left: high-voltage transmission line of Anaconda ACSR being strung in the Northwest.

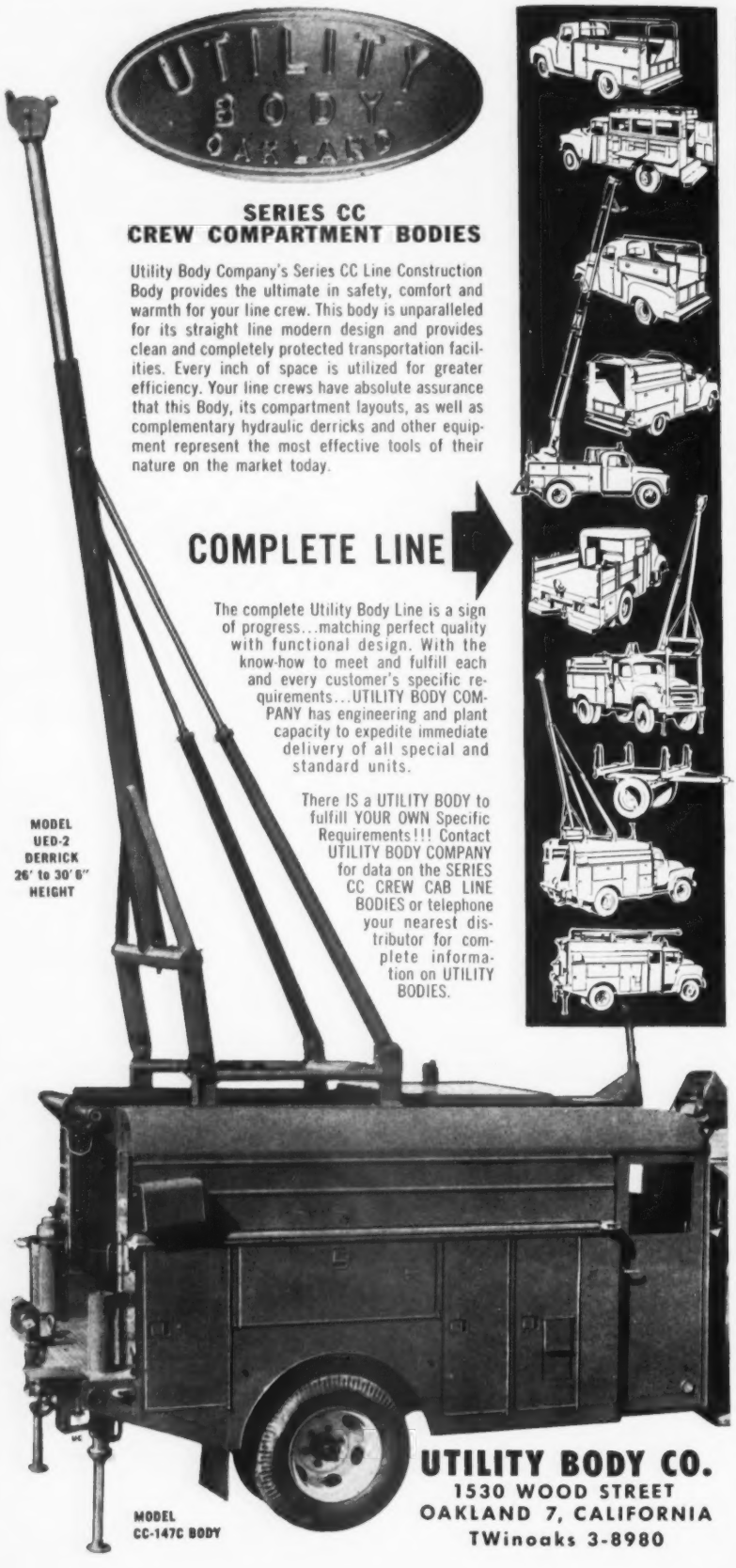
ASK THE MAN FROM

ANACONDA®

FOR

ALUMINUM WIRE AND CABLE

FASTEST WESTERN SERVICE – At Orange, California, Anaconda's expanded, modernized mill fabricates and stocks copper and aluminum wire and cable for *every type of application.* Anaconda assures the fastest possible service on all West Coast needs. See Anaconda Sales Offices: Los Angeles, San Francisco, Seattle, Denver.



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CREW COMPARTMENT BODIES

Utility Body Company's Series CC Line Construction Body provides the ultimate in safety, comfort and warmth for your line crew. This body is unparalleled for its straight line modern design and provides clean and completely protected transportation facilities. Every inch of space is utilized for greater efficiency. Your line crews have absolute assurance that this Body, its compartment layouts, as well as complementary hydraulic derricks and other equipment represent the most effective tools of their nature on the market today.

COMPLETE LINE

The complete Utility Body Line is a sign of progress...matching perfect quality with functional design. With the know-how to meet and fulfill each and every customer's specific requirements...UTILITY BODY COMPANY has engineering and plant capacity to expedite immediate delivery of all special and standard units.

There IS a UTILITY BODY to fulfill YOUR OWN Specific Requirements!!! Contact UTILITY BODY COMPANY for data on the SERIES CC CREW CAB LINE BODIES or telephone your nearest distributor for complete information on UTILITY BODIES.

MODEL UED-2 DERRICK 26' to 30' 6" HEIGHT

MODEL CC-147C BODY

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Market Development

Electrical Nurse

A self-help bedside unit developed for the new $2 million Seventh Day Adventist hospital in Boulder, Colo., reduces demands on the nursing staff by 25%.

Fingertip controls operate window draperies, adjust bed to seven positions, operate lighting units, tune in radio, TV or piped music, summon a nurse.

There is also a built-in refrigerator, outlets for toaster, shaver and other appliances. Cabinet space takes care of hospital equipment and personal belongings. A pull-down sink is within arm's reach.

The unit was designed by H. E. Rice, former administrator of the Boulder Sanitarium, working with the Angelo Colonna Co. of Philadelphia. Said to be the first such cabinets in the U. S., the 21 Boulder units, costing about $1,000 each, more than paid for themselves in space saved, according to Administrator Harvey C. Hartman. However, the basic purpose, he said, is to make the patient happier and more comfortable.

Performance Standards For Air Conditioners

A product standard establishing uniform procedures for determining the performance of room air conditioners under specified test conditions has been developed by the Room Air Conditioning Section of the National Electrical Manufacturers Assn.

The standard also contains the industry's definition of a room air conditioner and provides that those built to NEMA standards in the future shall carry a name plate giving the unit's total cooling capacity and/or heating capacity in Btu per hour as tested and rated under the provisions of the standard.

Cool Customers

Portland banks have more cool customers than any other type of business, judging from a survey of Portland General Electric commercial accounts made last summer by two student engineers.

In a study of 1,732 firms, the students, Dan McLellan and Chuck

Shirley, Oregon State College seniors, found 71% of the banks air conditioned. Other top percentages went to restaurants, 64%; taverns, 46%; jewelry stores, 43%.

Many of the firms without air conditioning said installation costs were responsible. Those with it said their investment had been returned in increased business.

Bargain Train

A 167-car Great Northern Bargain Train recently took 10,500 General Electric appliances into the Northwest. The big order was a combined purchase by 124 appliance retailers in Washington, Oregon and Idaho who have a pooled investment of more than $3 million in 1959 models.

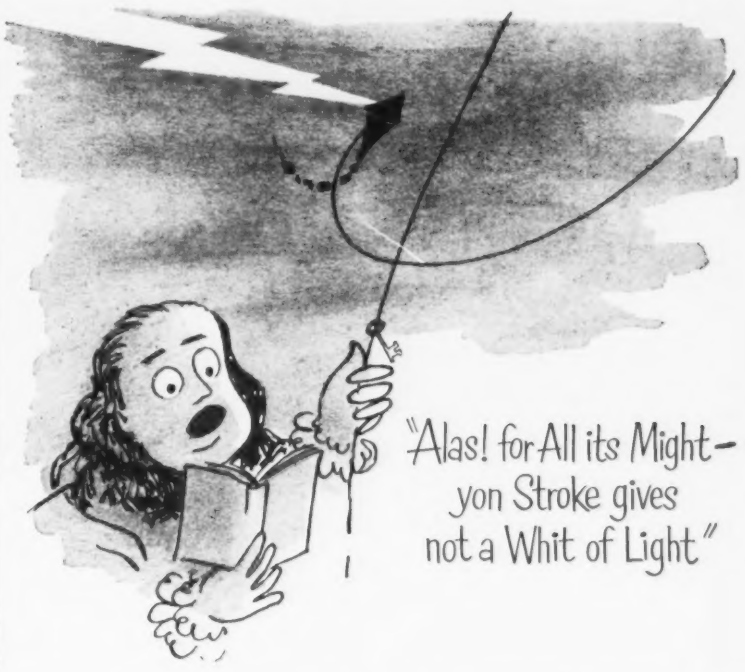
The train was made up in Louisville, Ky., and routed direct to Spokane, where cars were switched to Northwest cities. According to B. L. Heywood, G-E Northwest district manager, savings from the pooled order will be passed on to consumers.

Great Northern officials said the train, more than a mile long, carried the largest shipment of manufactured goods ever moved to the Pacific Northwest over its lines.

► Seattle City Light's Homemakers Notebook TV show brought in 2,000 booklet requests in its first month, according to **Mary Norris,** home economist. The program on KIRO-TV at 8:30 weekday mornings has also received a good deal of fan mail from women viewers.

► Newly created post of Salt Lake district sales manager for General Electric Supply Co. has been filled by **Earl B. Mathews,** R. S. Belnap, district manager, announced. A native of Salt Lake and former district sales manager for housewares and radio, Mathews has been with G-E Supply since 1939. Also announced was appointment of **J. M. Stucki** of Pocatello as apparatus specialist for the Salt Lake sales district. He was southern Idaho representative.

► Officials of the **Inland Empire Electrical League** said that **home laundry sales** during the "perfect pair" promotion by the league and its members resulted in the sale of 1,166 washers, 923 dryers and 145 combination units. They termed the compaign month one of the best for home laundry sales in recent years. The promotion stressed that "it takes the two to do."



Ben might have been disappointed by the miserly amount of light generated by a first class lightning flash, but it makes *us* happy. It means we don't have to build a long time delay into our photoelectric streetlight controls to prevent accidental turn-off due to lightning. Because "just how bright *is* a lightning flash?" still *is* a question in many minds, here's what we know about it.

Our newest controls – the tubeless 6600A Series – will not turn off until they see at least three or four foot-candles of light for half a second or longer. In comparison, the average lightning flash doesn't begin to reach this light intensity (in the limited vision of the control)—and rarely lasts more than *0.001 of a second.* The real clincher, though, is what has happened in the field. About 2000 F-P controls, some with a half-second delay and the rest with *no* delay, have been through two annual seasons of electrical storms in typical utility service. *The number of accidental turn-offs has been zero!* Where headlights, sign lighting and the like are a possible threat, directional F-P controls can be aimed a few degrees away from these sources.

By keeping time delay down to half a second – installers can check out their work and the control as fast as they can put their hand over the control's window, saving both time and money. Short delay also eliminates waiting periods and false readings when controls are inspected and calibrated back in the shop. And a control without a special delay circuit in it is that much easier to build – and cheaper to buy.

Fourteen years ago we thought a six- or eight-second delay was vital, and took the trouble to see that F-P controls had it. Times have changed, controls are up higher on the pole, and a control for each lamp is more and more the practice. It just doesn't seem sensible anymore to make a control shut its eyes to an evil that no longer exists. The Fisher-Pierce Co., 43 Pearl Street, So. Braintree 85, Massachusetts.

FP

FISHER PIERCE

PHOTOELECTRIC LIGHTING CONTROLS

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

Western Women on LBE Program

Four Western utility home service directors took part in the third annual Live Better Electrically Women's Conference in Chicago Jan. 8-10. The program, Facing the Challenge of Change, was planned under chairmanship of Ruth Kruger, Arizona Public Service Co.

Early Morning Energizers for Customers and Sales was the title of a talk by Marguerite Fenner, Pacific Gas and Electric Co., describing her company's Better Breakfast program. (This load builder will be described in a later article.)

Hawaiian Electric Co.'s Youth program was described by Erma Meeks Boyen in Catch 'Em Young.

Evelyn Conant, Southern California Edison, told of her company's successful Medallion Home program.

E. T. Story Told in Chicago

Montana's Electrical Tuesday promotion got national recognition when D. J. McGonigle, general sales manager of Montana Power Co., told its story to NARDA's annual convention in Chicago on Jan. 12.

This industry program from March 1958 through January 1959 placed 2,041 ads in Montana newspapers, totaling 76,683 column inches. In line with its belief that industry cooperation will get results, Montana Power will give this title to its National Electrical Week ad: It Takes a Team to Fulfill Edison's Dream.

Blueprint for '59

A total of 549,060 electric appliances will be sold in Pacific Gas and Electric Co. territory in 1959, if 12-month sales objectives are achieved. Design for '59, this year's edition of PG and E's annual Market Outlook, breaks down its sales objective into units, tells what advertising support the company will give.

Population growth for 1959 is estimated at 3.6%, adding about 538,000 in the state and some 215,000 in PG and E territory. By the end of the year the state's population is expected to reach 15,552,000, that of the company service area 6,525,000.

The company estimated that 67,700 new homes will be built in its territory during 1959 for an 8% increase over 1958. Of this, 58,250 would be single family dwellings, up 10% from 1958.

ELECTRICITY DOES EVERYTHING — This weather control center masterminds the atmosphere in the Total Electric Home, which Westinghouse has on tour. From this center it is possible to actuate heating and cooling equipment and to control the Precipitron and germicidal lamp. The center also controls self-adjusting sun shades and draperies; de-ices sidewalks and controls lawn sprinklers. The instrument panel contains wind direction and velocity gages, a barometer, inside and outside thermometers and humidity indicators. According to Chris J. Witting, vice-president in charge of Westinghouse consumer products, the company will spend $2,500,000 during 1959 on a public information program introducing the concept of the Total Electric Home. The name was chosen, he said, because the term "all-electric" has become diluted. This term means that everything is electric — there is no other source of energy or fuel in "total electric"

PG and E will continue active in regional development work. It expects the 1958 record of some $400 million in industrial expansion to be equaled in 1959.

Further gains in electric power sales to industry and agriculture are forecast.

The 32-page booklet is in attractive format and is well illustrated with charts and photos.

Top Medallion Builder

Southern California Edison Co. ended 1958 with close to 9,000 Medallion Homes on its lines. Ross Cortese, proclaimed National Medallion Home Builder of the Year in an Edison award, plans to bring the total Medallion homes at his Rossmoor development to 4,000. The first 1,500 homes in the tract gave Rossmoor the title of biggest Medallion City in the nation.

► Loads that began to increase in September will continue to increase early in 1959, the Puget Sound Utilities Council was told by its consulting engineer, Jack D. Stevens. The upturn from lower loads early in 1958 is due to colder weather and generally improved economic conditions over those existing during the business recession, Stevens said.

Focus on Electric

Fresh focus on foods, equipment and fashions, a one-day program for home economists sponsored by PCEA's home economics committee, was attended by 110 from schools, utilities and allied fields. Mrs. Evelyn Conant, home service director for Southern California Edison, presided at the meeting in the G-E Appliance Sales auditorium at Vernon, Calif. William Frogue, G-E district manager, was host.

California Foods in Action was presented by Keith Thomas of California Foods Research Institute, San Francisco. Small appliances were used to demonstrate three themes: food from the far east; western ways with western foods in the patio; party foods.

Slides with information on baking time for good results were shown by Marylee Duehring of General Mills, Minneapolis, in a talk on making demonstrations fun and easy with mixes.

The Walkie-Cookie radio controlled oven now in the experimental stage was presented by Lorine Craft, home economist for Westinghouse Appliance Sales Co., Los Angeles.

A fashion show tied in with wash and wear materials was an afternoon feature. Other talks dealt with selling kitchen equipment decorating trends.

There's a good reason WHY...

Allis-Chalmers uses

10 OPERATIONS TO PROTECT

tank surfaces of distribution transformers

NATIONAL ELECTRICAL WEEK
FEBRUARY 8-14, 1959

ADDS YEARS to tank life

THE gleaming, blue-gray surface of Allis-Chalmers distribution transformers stubbornly resists severest weather conditions, salt and acid atmospheres for a good reason. First, the original surface of the tank is converted to a non-metallic phosphate surface through a sequence of five separate chemical and cleaning baths. Then, two coats of synthetic resin base enamel are "hot sprayed" on the tank. Each coat is oven baked. Finally, after the transformer is assembled, the finish coat of enamel is applied. Then, to assure uniform, specified paint thickness, all tanks are gauged magnetically. Result: Far less corrosion maintenance — extra years of tank life.

For *all* the good reasons why Allis-Chalmers distribution transformers assure outstanding performance for many years, call your A-C man, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5716

P. J. Swanson, supervisor of home economics for Los Angeles Department of Water & Power, and Jean Williams, senior home economist, congratulate Cherie Courtois (center) of Bishop Conaty High School, winner in the district cherry pie bake-off. Her pie qualified her to participate in the state-wide bake-off at the department's Van Nuys Service Center. The department with several food industries conducts the local competitions

Guide Answers School Requests

About 5,000 copies of the educational booklet "Electricity—How It Is Put to Work" have been distributed by Washington Water Power Co. to schools in Spokane and throughout the eastern Washington and northern Idaho territory of the company.

The booklet was prepared by the WWP general sales, promotion and information department and was designed primarily as a teacher's guide. It was prepared because the company had received a number of requests from teachers and students for basic information on electricity. It is designed primarily for students in grades six through eight.

It contains a history of electricity from Thales, in 600 B.C., to Thomas Edison, listing the important contributions by such men as Dr. Gilbert, Von Guericke, Stephen Gray, Benjamin Franklin and Michael Faraday. It explains in language the students can understand what electricity is and how it is produced.

Hydroelectric generation is explained and traced from water storage to the residential meter.

Each chapter ends with a series of questions and study suggestions pertaining to the material presented. It has an appendix of simple illustrated work projects for the students.

The booklet is supplemented by wall charts, one of them showing graphically how electircity is generated, transmitted and distributed to industry, farms and homes. A second chart depicts a watt-hour meter with movable pointers as well as a rate schedule. The booklet was approved by the superintendent and the curriculum staff of the Spokane school district.

► Harry S. Billings, Billings & Schattinger, Fresno, took top national honors in Hoffman's first annual new dealer franchise competition. He made 328.6% of his assigned quota in franchising selected new dealerships.

► Graybar took over distribution of the Philco line at Spokane in December. A new sales organization has been set up with **Kenneth M. Wilkins** as appliance manager.

► Ramsay has opened its fourth retail branch in Hawaii, at Windward City Shopping Center. **Yoichi Inoue** will manage the branch, which carries a complete line of G-E appliances.

► Bert A. Johnson of Seattle has been named sales promotion and advertising manager for Hotpoint in the Pacific Northwest. He had been sales counselor for the past two years and previously was with Graybar.

► Under a new program launched by **G-E-Telechron,** retailers may exchange older clocks in the line for currently advertised models, provided they do so before Feb. 28. The plan is being advertised under the slogan, Colossal Clean Sweep.

Manufacturers—Distributors

ESD Expands

Another big independent wholesale chain is in the making with the purchase by Electric Supplies Distributing Co., San Diego, of Phoenix Electric Supply Co., Phoenix. Jack Doughty, former owner of the Phoenix firm, will continue as manager with the same organization and under the same name.

Bart Murray, vice-president of ESD of San Diego, is in over-all charge of the change-over and establishment of parent company policies, according to Fred G. Goss, president. Most of the manufacturers' lines will be continued, strengthened by additional lines needed in the area.

This makes the seventh house of the company, others being in Long Beach, Santa Ana, Arcadia, Anaheim and El Centro. The company also owns Distributors Inc., appliance distributorship.

► Eugene Fioramonti has been appointed Western regional sales manager for the **Narda Ultrasonics** Corp. of Westbury, N.Y., maker of Son-Blaster brand ultrasonic equipment. Active in the field of ultrasonic application research and product and market development, Fioramonti was formerly associated with the Bendix Aviation Corp. and Curtiss-Wright Corp. His headquarters are at Narda's new West Coast sales and service office at 3259 Wilshire Blvd., Los Angeles 5.

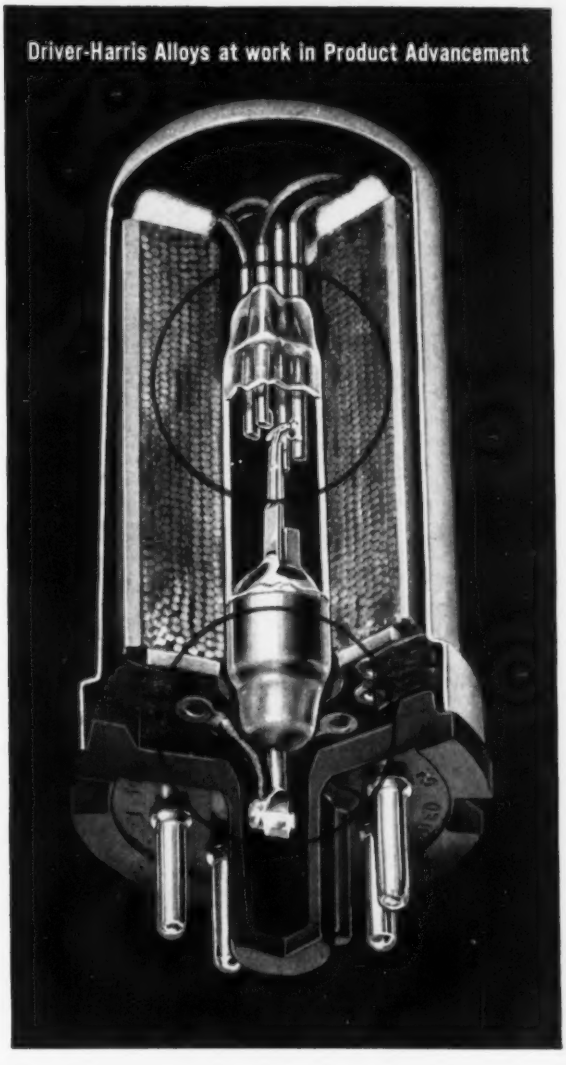
Fioramonti

► Western Switchboard, San Francisco, has announced the election of new officers and personnel changes. Charles A. Langlais is chairman of the board of directors; William A. Langlais, president; R. R. Crooke, vice-president; C. E. Barkis, vice-president and manager; W. R. Blake, chief engineer; and Wesley Doyle, chief estimator.

► **Guardian Electric** Co. of Chicago has announced that its line of industrial controls are now available for delivery in the Los Angeles area and can be obtained through the Andrews Hardware & Metal Co.

Improved Metal-To-Glass Alloy Holds Seals Tight Against Hydrogen at 250 Pounds Pressure

Development of Clare† Mercury-Wetted Contact Relays aided by special gas-free Driver-Harris #152 Alloy



For all kinds of high-speed switching machines and devices which demand accuracy and dependability of the highest order, this new Clare Type HG Relay offers a combination of high speed, high current-and-voltage capacity with remarkably uniform long-life performance. It has a conservative life expectancy of more than a *billion operations* when operated within its ratings and can be driven at speeds up to *100 operations per second.*

In this cutaway view (2¾ x) a magnetic switch, hermetically sealed in a high-pressure hydrogen filled glass capsule, and a coil, are enclosed in a steel vacuum tube type envelope. The switch forms the core of the coil which provides the magnetomotive force for operating it.

The glass enclosed switch is very compact and small (5/16″ diameter x 2″ long) yet its handling capacities of 5 amperes and 500 volts maximum are truly remarkable.

These features of its construction make this possible. In the switch segment, the platinum contact surfaces are wetted and protected from electrical and mechanical erosion with mercury by means of a capillary connection to a mercury reservoir below the contacts. In addition, the high hydrogen pressure enables the contact gap to withstand a high voltage gradient without breakdown.

Keeping the gas from leaking posed a production problem. The specifications for the lead wires at the top of the switch and the tubular vacuum stem at the bottom were stiff. 1. Gas-tight seal against hydrogen at 250 PSI. This was difficult. 2. Perfect match to thermal expansion characteristics of the glass. 3. Good ferromagnetic properties. 4. Exceptional surface bonding properties since the permissible maximum 5 ampere 500 volt limits are dictated rather by factors relating to heating of the metal-to-glass seal than the current handling capacities of the contacts.

Driver-Harris was called upon to produce such an alloy and succeeded in developing a special gas-free nickel-iron alloy No. 152 which meets all these requirements to the complete satisfaction of Clare Engineers.

Do your engineering and product development plans hinge upon a special alloy — why not discuss it with Driver-Harris. We have, since 1899, produced 132 special purpose alloys in just this fashion — in answer to a particular problem and extraordinary specifications. We have a special bulletin on Sealing Alloys if you care to have one. Your inquiry is awaited.

†C. P. Clare & Co., Chicago, Ill.
*T.M. Reg. U.S. Pat. Off.

DRIVER-HARRIS* COMPANY

HARRISON, NEW JERSEY

Distributor: ANGUS CAMPBELL, INC. • 4417 South Soto Street, Los Angeles 58 • 760 Tennessee Street, San Francisco 7

MAKERS OF THE MOST COMPLETE LINE OF ALLOYS FOR THE ELECTRICAL, ELECTRONIC, AND HEAT-TREATING INDUSTRIES

► Forrest Pope, Western sales manager of **Pfaff & Kendall,** reports two appointments. **C. A. Peterson** Co., 784 E. 14th Place, Los Angeles 21, will handle aluminum lighting standards and luminaires in southern California and Clark County, Nev. **John C. Henberger** Co., 3536 Crown Point Drive, San Diego 9, will have traffic equipment in the same areas and Arizona.

► **R. S. Hughes** Co. Inc., with offices at 1759 Victory Blvd., Glendale, Calif., and 564 College Ave., Palo Alto, has been appointed exclusive sales agent for 11 Western states by **Permali** Inc., Mt. Pleasant, Pa. Permali's will be stocked in both Los Angeles and San Francisco.

► The **Slaughter** Co. of Piqua, Ohio, has appointed **Peninsula Associates** as West Coast representative covering the States of California, Washington and Oregon. Slaughter manufactures a complete line of standard high voltage insulation testers as well as special automatic production testing equipment of all types. Peninsula's regional offices are in Los Angeles, Redwood City, Spokane and Seattle.

► **Kurman Electric** Co. of New York, a division of Norbute Corp., has named the **C. H. Mitchell** Co. of Los Angeles as West Coast representative. Kurman manufactures relays for electrical, electronic and industrial use.

► **Sol Cohn** of California Electric Supply Co., San Francisco, traveled the farthest to attend Holophane's recent distributor conference in New York City. The two-day meeting at the Light & Vision Institute was attended by managers, lighting and lamps, of GESCO, WESCO and Graybar with their branch sales representatives and independent distributors.

Cohn

► **George Larsen,** Larsen-Hogue Electric Co., was in Cleveland recently to get ready for his new position as regional director of NISA.

► **Leonard L. Minthorne** Co., 0673 S. W. Taylors Ferry Road, Portland, has been named representative for **Surco Electronics** of Los Angeles. First carload of the firm's line of TV picture tubes was received early in December and will be warehoused in Portland.

Frederick Keller (left), president of Thomas Industries, greets Jerry D. Long, Moe Light sales representative from California, at the recent Louisville sales meeting. The new line introduced includes a Spiralite series of matched fixtures, a dimmer switch and a conversion kit for pendants, in addition to chandeliers, pole lights, ceiling fixtures

► **Ray B. Cox** has taken over the newly created post of vice-president and general manager of the Consumer Products Division for Hoffman Electronics Corp. Cox went with Hoffman after selling his interest in Horn & Cox, Los Angeles appliance distributor, and since June has been general manager of Hoffman Sales Corp. of California. **John B. Chadwell** will take over that position and **Paul E. Bryant** will continue as vice-president-sales for the division.

► **Tom Arthur** and **R. D. Hamilton** of **Dale G. Weber** Co., 8 S. E. Clay St., Portland, attended a technical seminar held by the Service Instrument Corp. in Chicago Dec. 15-16. The meeting was to familiarize sales representatives with the firm's new items and programs in its Sencore service equipment line.

► **J. L. "Jerry" Coons** has been transferred to the sales engineering force of **J. A. Tudor & Associates,** 2605 Western Ave., Portland. Taking over his former position as office manager is **L. J. "Les" McMurry,** who has handled the inside sales desk. **R. A. Haugenberger** has been brought in from the outside sales staff to the sales desk.

► In a concerted effort to "narrow the time and distance gap between introduction and use" of a new product, **Federal Pacific Electric** Co. staged a five-day QMQB Week to in-

Here are the Graybar Offices in the West

ARIZONA

Phoenix:	1700 North 22nd Ave. ALPINE 2-2371
Tucson:	212 South Park Ave. TUCSON 2-6439

CALIFORNIA

Fresno:	101 Van Ness Ave. ADAMS 7-4175
Long Beach:	800 West 16th St. HEMLOCK 2-2911
Los Angeles:	210 Anderson St. ANGELUS 3-7282
Oakland:	1911 Union St. GLENCOURT 1-5451
Oceanside:	805 N. Tremont St. SARATOGA 2-2141
Sacramento:	1900 – 14th St. GILBERT 2-8976
San Bernardino:	655 South "H" St. TURNER 9-1051
San Diego:	720 State St. BELMONT 3-1361
San Jose:	1376 N. Tenth St.
San Francisco:	1750 Alameda St. MARKET 1-5131
Santa Ana:	301 French St. KIMBERLY 3-8309
Van Nuys:	15520 Cabrito Road STATE 2-9600

COLORADO

Colorado Springs:	630 West Vermijo Ave. MELROSE 4-3701
Denver:	104 Wazee Market TABOR 5-7111

IDAHO

Boise:	1325 Idaho St. BOISE 2-4501

MONTANA

Butte:	604 E. Aluminum St. BUTTE 3233

OREGON

Eugene:	2580 West Broadway DIAMOND 4-2224
Portland:	Park & Flanders Sts. CAPITOL 7-6641

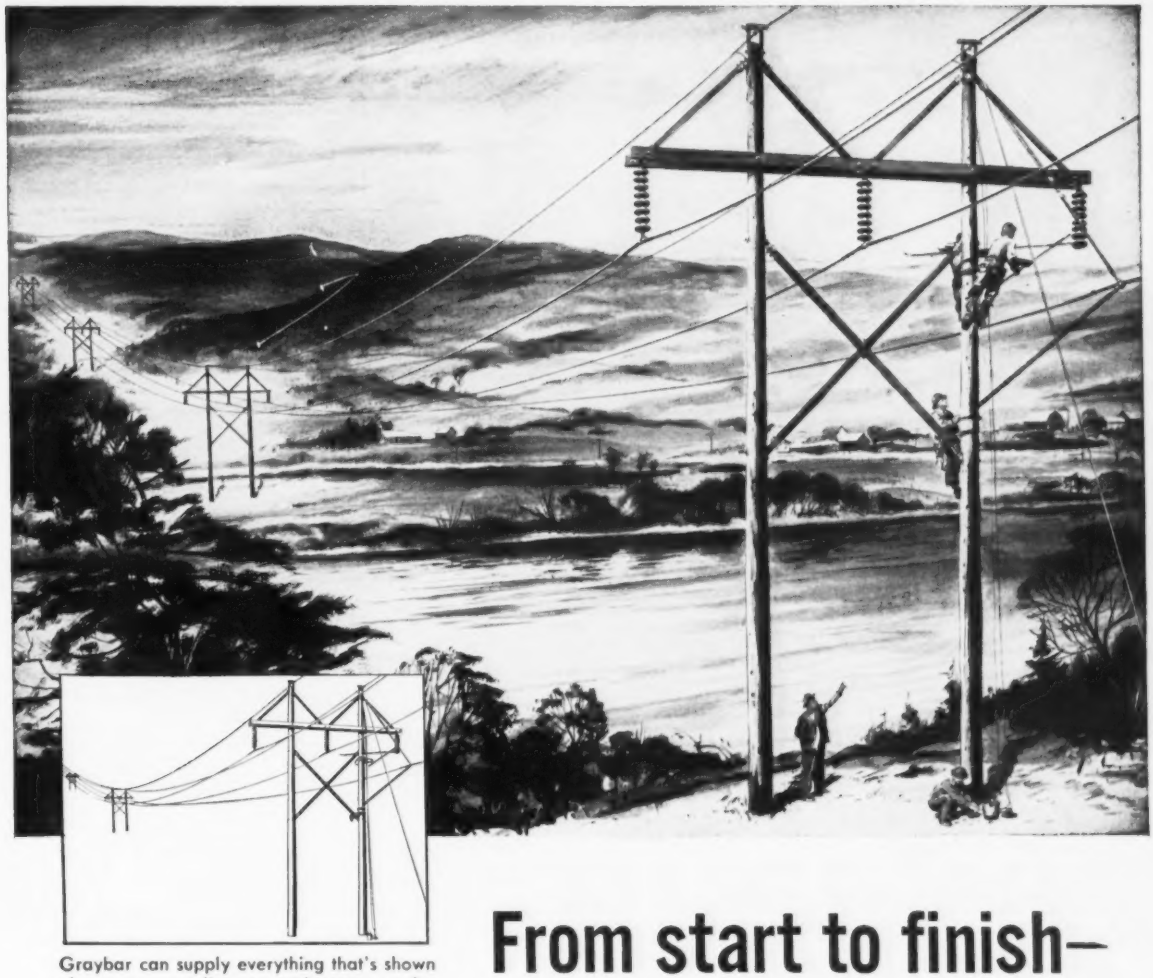
UTAH

Salt Lake City:	336 North Third West St. ELGIN 9-8771

WASHINGTON

Seattle:	King & Occidental Sts. MUTUAL 2-0123
Spokane:	West 1033 Gardner Ave. FAIRFAX 7-6611
Tacoma:	2112 "A" St. MARKET 0164

FOR IMMEDIATE SERVICE ON EVERYTHING ELECTRICAL CALL THE OFFICE NEAREST YOU



Graybar can supply everything that's shown above — except linemen and scenery — for line construction *and* maintenance. Poles, crossarms, hardware, tools—a partial list of items that are stocked at strategic Graybar locations throughout the country. All available for fast delivery to you. It pays to call Graybar . . . *first.*

From start to finish—
arrange for continuing supplies and equipment—with Graybar

Engineers deep in the problems of new transmission *line construction* must be able to depend upon reliable, on-time deliveries to keep their schedules. And later, to meet the continuing task of *line maintenance*, the selection, dependable delivery and warehousing of supplies and equipment are vital.

Graybar backs up design and construction engineers to speed up these processes. Through more than 130 offices and warehouses, Graybar supplies prompt catalog information on everything electrical needed in line construction and maintenance.

To speed up the selection and delivery of anything and everything you need for line construction and maintenance call Graybar first. *Graybar Electric Company, 420 Lexington Avenue, New York 17, N. Y.*

713

CALL **GraybaR** FIRST FOR

GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

troduce its quick-make, quick-break fusible panelboards and switchboards. Company salesmen, oriented in meetings all over the country, were given a thorough grounding in the product, were told how it would be advertised.

► **Dave Fry,** formerly with Rockwell Mfg. Co., has joined **Andrew L. Polich** Inc., 734 N. W. Glisan St., Portland, where he will work principally with the firm's industrial customers. **Andy Polich** will continue to handle utility contacts.

► **American Television & Radio Co.** of St. Paul has purchased the **Eckstein Radio & Television Co.** of Minneapolis and will market that line under its own label.

► **Stromberg-Carlson-San Diego** is planning its second expansion in engineering and manufacturing facilities within a year. It will build a 15,750-sq-ft building adjacent to its present electronic systems plant at 1895 Hancock St.

► **G-E** has designated 11 industrial and aircraft instrument repair centers coast to coast to maintain and repair more than 200 types of instruments. In the West a shop at Denver will service both industrial and aircraft instruments; a San Francisco shop will work on industrial instruments only and a shop at Ontario, Calif., will service only aircraft instruments.

► **Collins Electronic** Sales, 535 Middlefield Road, Palo Alto, Calif., will handle the **William Brand & Co.** line of wire cable and insulating tubing in northern California.

► As part of its dealer expansion program, **Four Wheel Drive Auto Co.** has appointed **Deseret Dodge Truck Center,** 2299 S. State, Salt Lake City, to sell its trucks and other specialized vehicles. The Utah company will cover southwestern Wyoming, southeastern Idaho and most of Utah. K. D. Bullock is vice-president and general manager.

► **Delta-Star** has taken to the road with a two-wheel trailer carrying its insulator line on a nation-wide tour. Latest designs and operational techniques are being shown. Features are a model distribution line strung between two utility poles and working models of a flashover tester and impulse tester.

► **Tom W. Osborne** has been transferred to San Diego by G-E Appliance to replace **George Yoshonis,** who has been made Hotpoint manager in San Diego. Osborne had been sales counselor at Los Angeles.

Price Sheet Standards Urged by NAED

Suggested specifications for illustrated price sheets have been prepared by the catalog committee of National Association of Electrical Distributors, which is asking support from electrical manufacturers. Three years of research have gone into the program, which covers format, size, type, punching and general appearance. Color coding is specified to distinguish the three classes of costs used in the industry: goldenrod, distributor; blue, contractor and dealer; pink, consumer.

► **Clyde W. Shaw,** vice-president and treasurer, was elected executive vice-president of R T & E Corp. **Edwin A. Link** has been advanced from chief engineer to vice-president in charge of engineering.

► **J. I. Rodale** has been made chairman of the board of Rodale Mfg. Co. **Elmer A. Barto** succeeds him as president and two vice-presidencies were created. **Jacob Schmier** is vice-president in charge of production and **Jack Kushner** vice-president in charge of sales.

(Continued on page 122)

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

EVERSTICK ANCHORS

For new construction and maintenance—Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

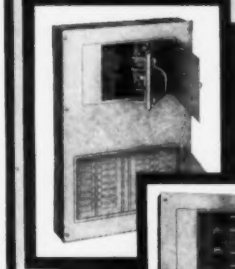
EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Since 1936 Pioneers in Photo-electric Street Lighting Controls!

WRITE TODAY FOR COMPLETE DATA

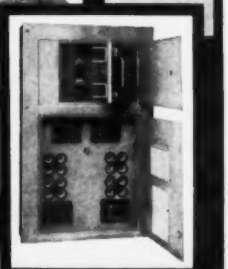
SunSwitch
DIVISION
RIPLEY COMPANY, INC., MIDDLETOWN, CONN.

200 AMPERE
HOUSEPOWER
FUSIBLE OR CIRCUIT BREAKERS
CONTROLS FOR WATER HEATER
AIR CONDITIONERS — HEATING PANELS



LIGHTS
RANGE
DRYER
ETC.

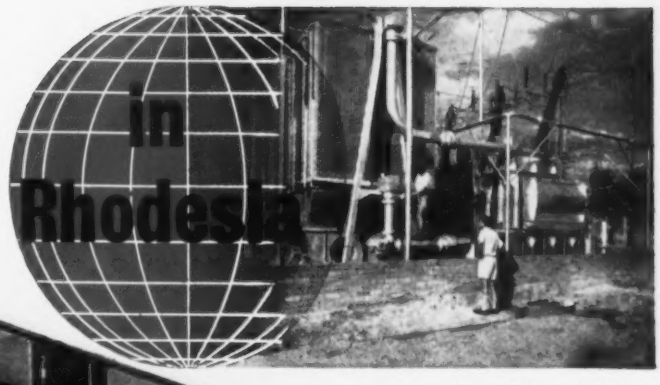
INDOOR
&
OUTDOOR



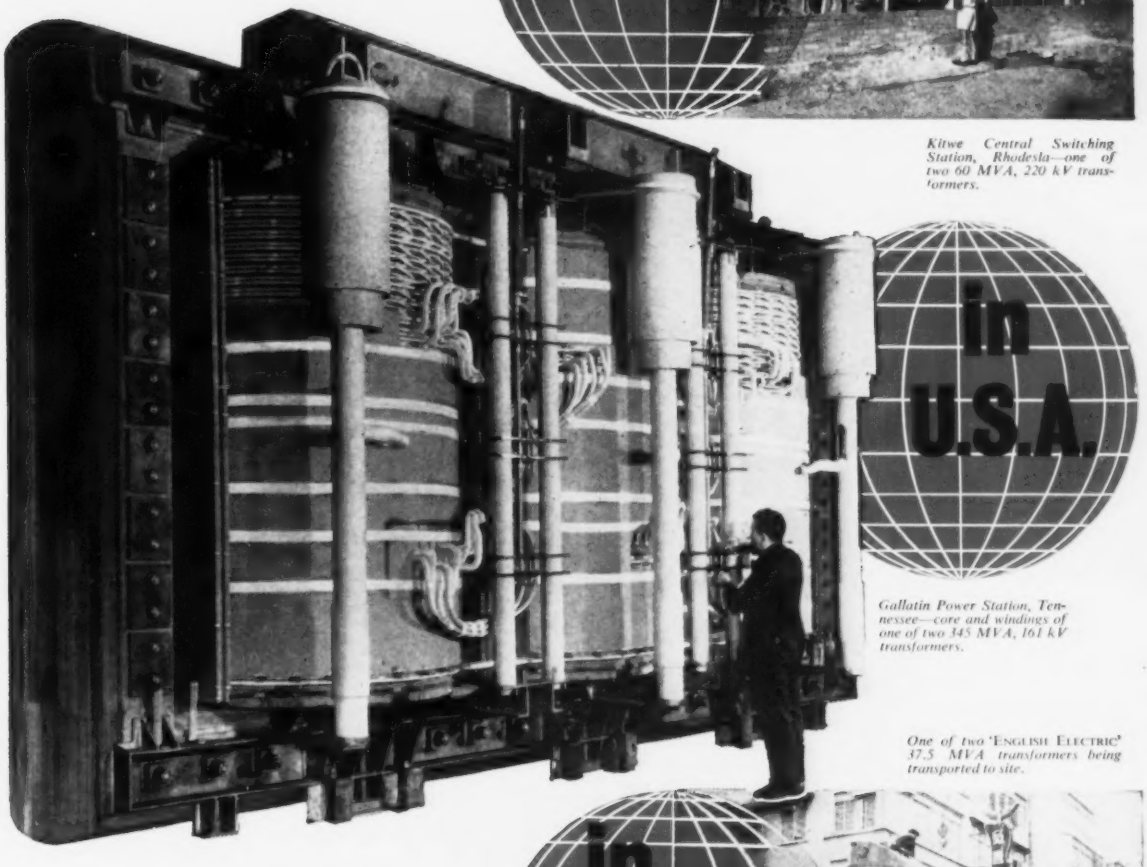
WRITE FOR FREE NEW CATALOG

The WADSWORTH Electric
MFG. CO., INC.
COVINGTON, KENTUCKY

Transforming the WORLD'S POWER



Kitwe Central Switching Station, Rhodesia—one of two 60 MVA, 220 kV transformers.



Gallatin Power Station, Tennessee—core and windings of one of two 345 MVA, 161 kV transformers.

One of two 'ENGLISH ELECTRIC' 37.5 MVA transformers being transported to site.

'ENGLISH ELECTRIC' transformers are in service throughout the world and can be supplied for voltages up to the highest envisaged and for outputs up to the largest practicable.

Two of the largest transformers in the world—345 MVA, 22.5/161 kV, 3-phase, 60 cycles—have been supplied by 'ENGLISH ELECTRIC' to a T.V.A. power station in Tennessee. Contracts have been completed and are in course of manufacture for many other major American power projects.

'ENGLISH ELECTRIC' products cover all aspects of the generation, transmission and utilization of electric power. Service facilities are available through three large Canadian plants.

'ENGLISH ELECTRIC'

Agents for Washington, Oregon, Montana, Idaho, Wyoming, Nebraska, California, Arizona, Utah, Nevada and the Alaska territory: **James I. Metcalf & Co. Inc.**, 701 United Pacific Building, Seattle 4, Washington. Branch offices in San Francisco, Los Angeles, Portland, Phoenix. Agents for Georgia, Alabama, Tennessee, South Carolina, Florida and Kentucky: **Osgood & Associates, Inc.**, 988 Spring St. N.W., P.O. Box 7383, Station C, Atlanta 9, Ga. Branch office in Birmingham, Ala. Agents for Louisiana and Mississippi: **Electron Equipment Co. Inc.**, 1050 Constance St., New Orleans, 13, La. Agents for Texas, Oklahoma, Arkansas and New Mexico: **Peabody Bros.**, 2903 St. Louis St. at Oakland, Dallas 26, Texas. Branch offices in Houston and Tulsa.

Enquiries for territories not covered by Agents should be directed to:

ENGLISH ELECTRIC EXPORT & TRADING CO., LTD., 750 Third Avenue, New York 17, N. Y. Telephone: Murray Hill 7-0303

CC/US/1

For qualities beyond your specifications —

CONDULETS*...

made only by Crouse-Hinds

You'll find Condulet electrical equipment in two out of three plants across the country. It's there because electrical engineers have discovered that it provides *more* than standard performance.

And no wonder. Only Condulet rigid conduit fittings have all these features:

✓The wedge-nut cover fastener.

✓Longer hubs for a better wrench grip.

✓Taper tapping to match ASA standard tapered conduit threading for a rigid joint that will not loosen.

✓A triple long-lasting finish that exceeds Federal government and U.L. specifications.

✓A smooth, integral bushing to protect cable insulation.

✓Feraloy, a special alloy that is strong, resists corrosion, and gives full, sharp threads.

For installations where aluminum, plastic or plastic-coated conduit is used, we can supply either copper-free aluminum or plastic-coated Condulet fittings as required.

• *Next time you order, specify Condulet equipment. From the simplest fitting to complex motor controls, the name "Condulet" and the Crouse-Hinds trade-mark are your assurance of receiving the finest.*

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

• CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) • FLOODLIGHTING • TRAFFIC CONTROL SYSTEMS • AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. Salt Lake City St. Louis St. Paul San Francisco Seattle Tulsa Washington **Resident Representatives:** Albany Atlanta Baltimore Charlotte Chattanooga Jacksonville Reading, Pa. Richmond, Va. Shreveport

* CONDULET is a coined word registered in the U.S. Patent Office. It designates a brand of products made only by the Crouse-Hinds Company.

INDEX TO ADVERTISERS AND WESTERN SALES OFFICES

February 1959

Advance Transformer Co. **28**
Los Angeles: Ray J. Noel Co. AXminster 2-0191
San Francisco: Ray J. Noel Co. HEmlock 1-2176
Portland: Pete Bach Electric CApitol 7-2173
Denver: A. J. Nelson KEystone 4-6751
Mercer Island, Wn. ADams 2-8795
Albuquerque CHapel 2-8626

Allen-Bradley Co. **91, 92**
Los Angeles ANgelus 9-9421
San Francisco: Campbell & George MIssion 8-1236
Denver: Young Electric AComa 2-4841
Albuquerque: A & A Supply ALpine 6-0307
Salt Lake City: Stevens Sales INgersoll 7-5489
Phoenix: Edw. P. Weller AMherst 6-3188
Seattle: J. A. Tudor Associates MUtual 2-7444
Portland: J. A. Tudor Associates BElmont 2-1188

Allis-Chalmers Mfg. Co. **38, 39, 113**
San Francisco DOuglas 2-8384
Los Angeles MAdison 6-2231
Phoenix CRestwood 4-5426
Denver CHerry 4-6556
Salt Lake City EMpire 3-1723
Portland CApitol 2-9835
Seattle MAin 4-3737

All-Brite Fluorescent Fixtures, Inc. **105**
South San Francisco PLaza 5-7077
Los Angeles RIchmond 8-7311
Portland CApitol 3-9257
Seattle EAst 5-9600
Denver SKyline 6-1668
Vancouver, B. C. KErrisdale 9828

Anaconda Wire & Cable Co. **108, 109**
San Francisco YUkon 6-0051
Los Angeles MAdison 6-2371
Denver AComa 2-0616
Salt Lake City ELgin 5-3401
Seattle MAin 3-4686

Baldwin-Lima-Hamilton **55**
San Francisco MIssion 7-6781
Los Angeles MAdison 6-5631
Portland BElmont 2-4174
Seattle MAdison 4-5420
Denver ATlas 8-2684
Salt Lake City HUnter 5-0293

Blackburn Corp., Jasper **23**
Arcadia, Calif.: Roy Peck Asso. HIllcrest 7-8283
Oakland: John H. Ormond Co. TWinoaks 3-3235
Vancouver, Wash.: Bill Horning Sales OXford 4-4475
San Francisco: Kortick Mfg. (Ground Rods) VAlencia 6-6107

Brewer-Titchener Corp. **100**

Buchanan Electrical Products Corp. **104**
San Francisco: F. M. Nicholas YUkon 2-1964
Los Angeles: Allied Industries MAdison 8-2244
Denver: Fred A. Pease FRemont 7-2336
Seattle: Keeler, White, Inc. MAin 3-2367
Portland: Keeler, White, Inc. CApitol 7-0593

BullDog Electric Products Co. **51, 53**
Oakland: Safety Switchboard Co. LOckhaven 9-7001
Los Angeles: BullDog Elec. Products of L. A. ANgelus 9-8101
Portland: Coast Elec. & Mfg. Co. ATlantic 8-5373
Denver: Young Elec. & Mfg. Co. AComa 2-4841

Carol Cable Div., Crescent, Inc. **9**
San Francisco: F. M. Nicholas Yukon 2-1964
Los Angeles: Jack Payne Co. MAdison 4-7317
Seattle: Bruce-Emmett Co. MUtual 2-6737
Portland: Bruce-Emmett Co. BElmont 2-8117

Circle Wire & Cable Co. **47**
San Francisco: Brill Electric Sales SUtter 1-7547
Los Angeles: Elkins Electric Agency ANgelus 8-3385
Seattle: Electric Agencies MAin 3-2360

Condon Co., Earle S. **93**
Los Angeles DUnkirk 1-3951

Copperweld Steel Co. **4, 5**
Los Altos, Calif. YOrkshire 7-4556
Bellevue, Wash. GLencourt 4-1233

Crouse-Hinds Co. **120**
San Francisco GArfield 1-5267
Los Angeles RIchmond 9-3189
Seattle ATwater 3-7262
Portland CApitol 7-2115
Denver TAbor 5-6639
Salt Lake City EMpire 3-5513

Davey Tree Surgery Co. **106**
San Francisco SUtter 1-3377
Los Angeles MAdison 3-1929

Driver-Harris Co. **115**
San Francisco: Angus-Campbell, Inc. ATwater 8-4208
Los Angeles: Angus-Campbell, Inc. LUdlow 7-1236

Dupont de Nemours & Co., E. I., Elastomer Chem. Dept. **29**
Los Angeles LUdlow 2-6464
San Francisco DAvenport 6-7550
Seattle MElrose 2-6977
Portland CApitol 7-1281
Denver AComa 2-2347
Salt Lake City EMpire 4-3582

English Electric Co. Ltd. **119**
New York City Murray Hill 7-0303

Electric Tube Products **27**
Los Angeles: Weingart & Lustig ADams 3-4111

Everstick Anchor Co. **118**
Joslyn Pacific Co. in following cities:
Los Angeles LUdlow 7-4251
San Francisco UNderhill 1-7313
Seattle MAine 3-1957
Portland CApitol 3-5127
Graybar Electric Co. in following cities:
San Francisco MArket 1-5131
Denver TAbor 5-7111
Denver: Paul A. Douden KEystone 4-6798
Denver: Hendrie & Bolthoff Co. KEystone 4-4111

Fanner Mfg. Co. **10**
San Francisco: Sold Through Line Material Industries PLaza 5-8600
Los Angeles RAymond 3-6251 and OXford 5-2260
Phoenix ALpine 4-8471
Denver: Slaybaugh & Thompson AComa 2-5826
Portland: A. L. Polich CApitol 3-6241

Federal Pacific Electric Co. **18**
San Francisco ATwater 2-0810
Los Angeles CLinton 7-8281
Seattle ATwater 3-7801
Oswego, Ore. NEptune 6-4573
Salt Lake City: James Stephens Co. ELgin 5-3540
Denver: R. D. Florence Co. AComa 2-1573
Hamilton Associates CHerry 4-1505
Albuquerque: F. W. Gorman CHapel 7-1596
Phoenix: Elec'l. Eng. & Sales Corp. ALpine 3-0927

Fisher-Pierce Co. Inc. **111**
San Francisco: Maydwell & Hartzell ATwater 8-6900
Los Angeles: Maydwell & Hartzell MAdison 8-7245
Phoenix: Maydwell & Hartzell ALpine 2-5858
Seattle: Oscar Hogenson MAine 2-0737
Portland: J. A. Tudor Asso. BElmont 2-1188
Denver: Allen I. Williams MAin 3-0343

Gedney Electric Co. **17**
San Francisco: Baxter Co. MArket 1-8636
Los Angeles: Rutkin Electric Sales MAdison 3-1224
W. S. Sanderlin Co. in following cities:
Seattle ATwater 4-7777
Portland BElmont 5-0121
Salt Lake City: George Darger Co. ELgin 5-2873

General Electric Co.
Schenectady, Apparatus Div. **34, 35**
San Francisco DOuglas 2-3740
Los Angeles MAdison 5-7381
Phoenix ALpine 8-7724
Denver KEystone 4-7171
Boise 4-3021
Salt Lake City EMpire 4-1891
Portland ATwater 8-0281
Seattle MAin 4-8300

Graybar Electric Co. Inc. **116, 117**
San Francisco MArket 1-5131
Los Angeles ANgelus 3-7282
Phoenix ALpine 2-2371
Denver TAbor 5-7111
Boise Boise 2-4501
Butte Butte 3233
Portland CApitol 7-6641
Seattle MUtual 2-0123
Salt Lake City ELgin 9-8771

Helicopter Corp. of America **106**
Santa Monica, Calif. EXmont 8-6739
Salt Lake City INgersoll 6-4932

Hill Transformer Co. ..... **4th Cover**
San Carlos LYtel 3-2161
Los Angeles: Maddox Sales Co. MAdison 4-2306
Seattle: Wm. O. Proby & Assoc. MAdison 3-3483
Portland: Wm. O. Proby & Assoc. CApitol 8-7261
San Francisco: Campbell & George MIssion 8-1236
Denver: H. C. Guire SPruce 7-2864
Salt Lake City: Stevens Sales INgersoll 7-5489

Holophane Co. Inc. **41**
Atherton, Calif. DAvenport 4-4366
Bremerton, Wash. TRiangle 6-4069
Montebello, Calif. RAymond 3-5738
Littleton, Colo. PYramid 4-4527

Hotpoint Co., Div. G. E. Co. **107**
San Mateo-San Francisco DIamond 2-5591
Los Angeles MAdison 4-9201
Seattle MAin 3-8340
Portland CApitol 6-3776
Denver KEystone 4-0131

Hubbard and Co. **123**
Emeryville, Calif. OLympic 2-6600
Los Angeles MAdison 4-8631
Oswego, Portland NEptune 6-2390
Salt Lake City ELgin 5-9478

Indiana Steel & Wire Co. Inc. **22**
Graybar in following cities:
San Francisco MArket 1-5131
Los Angeles ANgelus 3-7282
Portland CApitol 7-6641
Seattle MUtual 2-0123
Denver TAbor 5-7111
Salt Lake City ELgin 9-8771

Jennings Radio Mfg. Corp. **40**
San Jose CYpress 2-4025

Kearney Corp., James R. **30**
Maydwell & Hartzell, Inc., in following cities:
San Francisco ATwater 8-6900
Los Angeles MAdison 8-7245
Seattle MAine 4-2368
Portland CApitol 8-4173
Spokane MAdison 4-3285
Salt Lake City: Conely Engineering Co. EMpire 3-5013
Boulder, Colo.: Robert Smith HIllcrest 3-1795

Kerite Co. **26**
San Francisco DOuglas 2-4118
Glendale, Calif. CHapman 5-3721

Klein & Sons, Mathias **20**
Glendale, Calif. HOllywood 5-4351

Killark Electric Mfg. Co. **42, 43**
San Francisco: F. M. Nicholas YUkon 2-1964
Los Angeles: Kenneth Anderson Co. ANgelus 8-6771
Seattle: Northwestern Agencies, Inc. MAine 3-8882
Denver: Kenneth B. Schumann Co. AComa 2-8913
Phoenix: Kenneth B. Schumann Co. AMherst 5-2863

KPF Electric Co. **102, 103**
Stockton, Calif. HOward 4-8381

Kuhlman Electric Co. **12**
Maydwell & Hartzell, Inc., in following cities:
San Francisco ATwater 8-6900
Los Angeles MAdison 8-7245
Seattle MAin 4-2368
Portland CApitol 8-4173
Phoenix ALpine 2-5858
Spokane MAdison 4-3285
Denver: Sales Engineers AComa 2-4893
Salt Lake City: Sales Engineers HUnter 5-3547

(Continued on page 122)

INDEX TO ADVERTISERS AND WESTERN SALES OFFICES

February 1959

(Continued from page 121)

Lighting Dynamics 124
Los Angeles ..... RAymond 3-9101
San Francisco ..... JUniper 6-5266
Seattle: Norwest Co. ..... ATwater 4-7820
Portland: Northwest Sales Co. ..... CApitol 3-5959
Salt Lake City: John W. Reynolds ..... HUnter 4-1133

Line Material Industries 3, 24, 25
San Francisco ..... PLaza 5-8600
Los Angeles ..... RAymond 3-6251
Portland ..... CApitol 2-1981
Seattle ..... ATwater 3-6368
Spokane ..... KEystone 5-2461
Salt Lake City ..... ELgin 5-6257
Phoenix: J. E. Redmond Supply ..... ALpine 4-8471

Maydwell & Hartzell, Inc. 21
San Francisco ..... ATwater 8-6900
Los Angeles ..... MAdison 8-7245
Phoenix ..... ALpine 2-5858
Portland ..... CApitol 8-4173
Seattle ..... MAin 4-2368
Spokane ..... MAdison 4-3285

Moloney Electric Co. 101
Garland Affolter in following cities:
San Francisco ..... EXbrook 7-1800
Los Angeles ..... MAdison 4-1864
Portland ..... CApitol 3-7349
Seattle ..... MUtual 2-4953
Denver: Hamilton Associates ..... CHerry 4-1505
Salt Lake: Riter Engineering ..... EMpire 3-7933

Narda Ultrasonics Corp. ..... 3rd Cover
Los Angeles ..... DUnkirk 8-2201
Palo Alto, Calif.: Pacific Radionics ..... DAvenport 6-6276

National Electric Products Corp. 54
Bennett & Associates in following cities:
San Francisco ..... UNderhill 1-1145
Los Angeles ..... RAymond 3-4654
Denver ..... PEarl 3-3741
Salt Lake City ..... DAvis 2-2701
Seattle ..... MAin 3-3775

Pacific Gas and Electric Co. 35
San Francisco ..... SUtter 1-4211

Pacific Pumps, Inc. 32
Los Angeles (Huntington Park) ..... LUdlow 8-2203
San Francisco ..... GArfield 1-4956
Denver ..... AMherst 6-0386

Pennsylvania Transformer Div. 45, 46
San Francisco: George E. Honn Co. ..... SUtter 1-7352
Los Angeles: John G. Corrin ..... MAdison 2-0830
Seattle: Fred W. Carlson ..... ATwater 4-4630
Phoenix: Roy E. Coulson ..... WIndsor 3-8935
Denver: Peterson Co. ..... DExter 3-5434
Salt Lake City: Clarence W. Silver ..... ELgin 5-5378

Preformed Line Products Co. 56, 57
San Francisco: K. M. Ryals Co. ..... YUkon 2-5510
Los Angeles: Earl S. Condon Co. ..... DUnkirk 1-3951
Seattle: Shaffer & Nelson ..... MUtual 2-0186
Portland: Shaffer & Nelson ..... BElmont 4-7437
Salt Lake City: Shaffer & Nelson ..... ELgin 5-8304
Denver: Peterson Co. ..... DExter 3-5434

R T & E Corp. ..... 2nd Cover
Portland ..... MErcury 9-2161
San Jose ..... ANdrew 4-5641
Arcadia, Calif.: Peck & Associates ..... RYan 1-5277 and HIllcrest 7-8283
Salt Lake City ..... HUnter 5-3457

Republic Steel Corp. 99
San Francisco ..... GArfield 1-0977
Los Angeles ..... MAdison 4-5144
Portland: Shaffer & Nelson ..... BElmont 4-7437
Seattle: Shaffer & Nelson ..... MUtual 2-0186
Denver: C. D. Belt Co. ..... SKyline 6-9421

Ripley Co. 118
Los Angeles: A. W. Nash ..... ANgelus 9-7304
Los Angeles: Blackwood's ..... ANgelus 8-2811
Phoenix: W. H. Eddy Co. ..... ALpine 2-6322

Rockbestos Products Corp. 44
Burlingame, Calif. ..... OXford 7-1060
Los Angeles ..... DUnkirk 7-7378
Seattle ..... MElrose 3-4344

Rome Cable Corp. 7, 58
Los Angeles ..... RAymond 3-3631
San Francisco ..... VAlencia 6-3580
Seattle ..... MAdison 4-3017
Salt Lake City ..... ELgin 9-8811
Denver ..... KEystone 4-0533

Royal Electric Co. Inc. 11
Los Angeles: Eckert-Lloyd Co. ..... RIchmond 7-9655
San Francisco: Eckert-Lloyd Co. ..... HEmlock 1-5792
Seattle: Northwestern Agencies ..... MAin 3-8882
Portland: Northwestern Agencies ..... CApitol 7-0434
Phoenix: Wm. Benndorf ..... CRestwood 7-1662
Denver: Hyde Electronics Co. ..... WEst 6-3456

S & C Electric Co. 37
Burlingame, Calif. ..... OXford 7-1130
San Gabriel, Calif.: Randolph Eng. Corp. ..... CUmberland 3-4183
Phoenix: Randolph Eng. Corp. ..... ALpine 8-5281
Salt Lake City: Riter Engineering ..... EMpire 3-7933
Seattle: Muth-Richards Co. ..... EAst 3-2128
Portland: Andrew L. Polich, Inc. ..... CApitol 3-6241

Southern California Edison Co. 33
Los Angeles ..... MAdison 4-7111

Southern States Equipment Corp. 48, 49
Seattle: Jos. C. Platt ..... MAin 3-6141
Salt Lake City: H. Lee Rawlings Co. ..... INgersoll 6-3703
Denver: R. T. Lewis Co. ..... EAst 2-8887
Los Angeles: W. E. Kirk Co. ..... MAdison 4-3651
Portland: H. C. Anderson ..... CApitol 2-4551
Oakland: John H. Ormond ..... TWinoaks 3-3235

Square D Co. 14
Los Angeles ..... CApitol 1-1171
San Francisco ..... JUniper 7-4590
Seattle ..... EAst 3-1474
Portland ..... BElmont 4-8488
Denver ..... KEystone 4-6234
Salt Lake City ..... DAvis 2-5859

Standard Oil Co. of Calif. 31
San Francisco ..... SUtter 1-7700
Los Angeles ..... MAdison 4-2711
Portland ..... CApitol 3-4161
Seattle ..... MAin 3-6310
Salt Lake City ..... DAvis 2-5831

Subox, Inc. 50
San Francisco: Waltham, deWitt & Krusi ..... GArfield 1-5054
Los Angeles: R. E. Cunningham & Son ..... MAdison 8-1105
Portland: Wm. J. Cottrell & Assoc. ..... CApitol 7-6191
Seattle: W. R. Hendry Co. ..... MAine 3-3968
Denver: Ambler Co. ..... TAbor 5-8885

Superior Cable Corp. 19
Maydwell & Hartzell, Inc., in following cities:
San Francisco ..... ATwater 8-6900
Los Angeles ..... MAdison 8-7245
Phoenix ..... ALpine 2-5858
Portland ..... CApitol 8-4173
Seattle ..... MAin 4-2368
Spokane ..... MAdison 4-3285

Utility Body Co. 110
Oakland ..... TWinoaks 3-8980
Los Angeles ..... RIchmond 9-6272
Portland ..... CApitol 2-9178
Seattle ..... ATwater 4-1172
Salt Lake City ..... DAvis 8-8341
Boise 3-4933

Wadsworth Electric Mfg. Co. Inc. 118
Seattle: Bruce-Emmett Co. ..... MUtual 2-6737
Portland: Bruce-Emmett Co. ..... BElmont 2-8117
San Francisco: Hodges & Glomb Inc. ..... UNderhill 1-2367
Los Angeles: Agencies Company ..... MAdison 6-5443
Denver: L. S. Reed & Co. ..... ALpine 5-1777

Wagner Electric Corp. 94, 95
South San Francisco ..... PLaza 6-0520
El Segundo, Calif. ..... ORegon 8-7671
Portland ..... CApitol 7-3654
Salt Lake City ..... EMpire 3-5013
Denver ..... MAin 3-0209

(Continued from page 118)

► Following purchase of **Okonite** by **Kennecott Copper Corp.**, it was decided to combine the two subsidiary wire and cable operations, making Kennecott Wire & Cable Co. a division of the Okonite Co. New name is the Okonite Co., Kennecott Wire & Cable Division.

► In recent executive appointments by **Hoffman's Consumer Products** Division, **R. L. Jablonski** was named product manager, **John Lathrop** budget and cost control manager, and **Edward Greaney** national parts and service department manager, the post held formerly by Jablonski. The first two are newly created positions.

► Preformed Line Products Co. has acquired from Industrial Rubber & Plastics Co. **facilities to neoprene dip and plastic coat** products used to attach and support covered power and telephone conductors. According to President Thomas F. Peterson, this will permit full-time use of the coating equipment to speed production and increase output.

► Johns-Manville has entered the fiber glass business, with acquisition of L. O. F. Glass Fibers Co. of Toledo and creation of **Johns-Manville Fiber Glass Inc.** Second largest firm in the fiber glass industry, L. O. F. has seven plants — one in Corona, Calif. — and a research and technical center. J-M Fiber Glass is the company's tenth operation division. R. H. Barnard, former L. O. F. president, will head the new subsidiary.

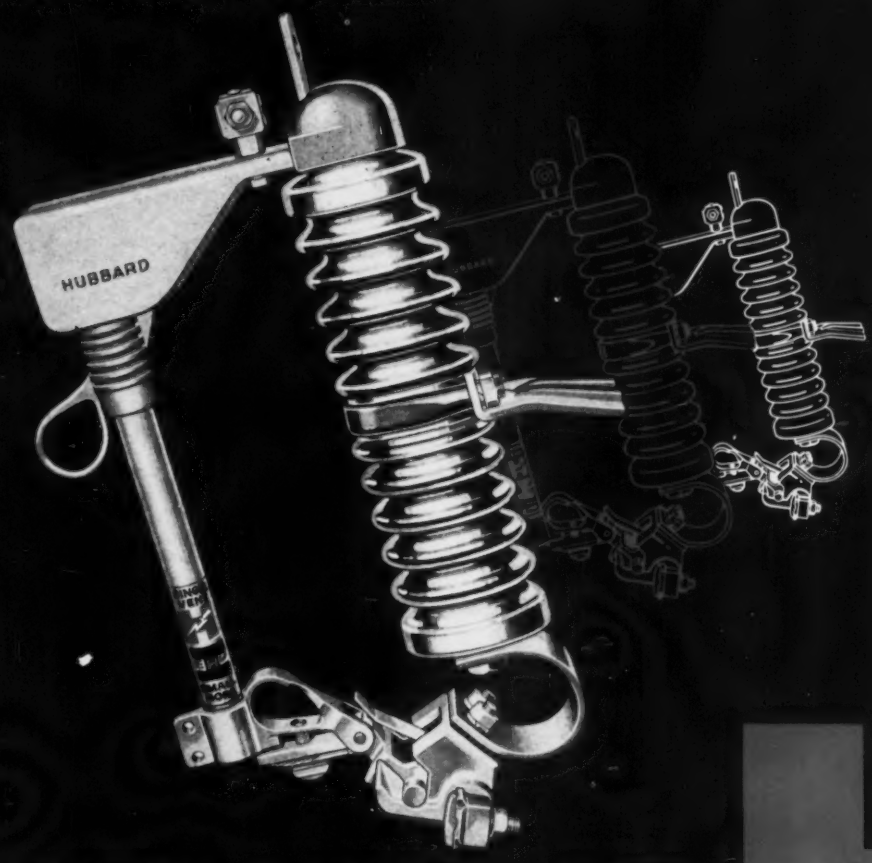
► J. M. Fink Co., Los Angeles manufacturer's representative, has taken on the **Electri-Flex Co.** line of Liquatite conduit, consisting of types LT, LA and HT. The conduit, manufactured in Roseville, Ill., is for use where outdoor wiring is required or in areas where oil might result in damage to unprotected wiring.

► Graybar has added to its distribution list products of the **Joy** Mfg. Co., **Electrical Products** Division.

► Carlisle Corp., Carlisle, Pa., has acquired the **Tensolite Insulated Wire** Co. and will operate it as a wholly owned subsidiary.

► Merger has been completed between **H. K. Porter** and **Thermoid** Co., manufacturer of industrial rubber and friction products, which becomes the Thermoid Division of H. K. Porter Co.

why buy three?



WHEN 1 WILL DO

THE HUBBARD

EHD

Look for this emblem. It is symbolic of the Hubbard EHD, the industry's first Single-Vent, Small-Bore Extra Heavy Duty Cutout—a single cutout that will provide positive and safe protection against all fault currents from the point of minimum fuse melting to the maximum rating of the EHD.

SINGLE VENT H EHD SMALL BORE

ONE CUTOUT, the Hubbard EHD Faultmaster, will fill the requirements of Standard, Heavy, and Extra Heavy Duty ratings. Buy ONE! Stock ONE! Inventory ONE! Plan for ONLY ONE!

Providing three capacities with one size means lower cost handling, warehousing, engineering and installation—and with the Hubbard EHD, you still get full range protection from minor overloads through the maximum EHD rating. All this—plus the increased safety of Single-Vent, Small-Bore operation. **Why buy three when one will do?**

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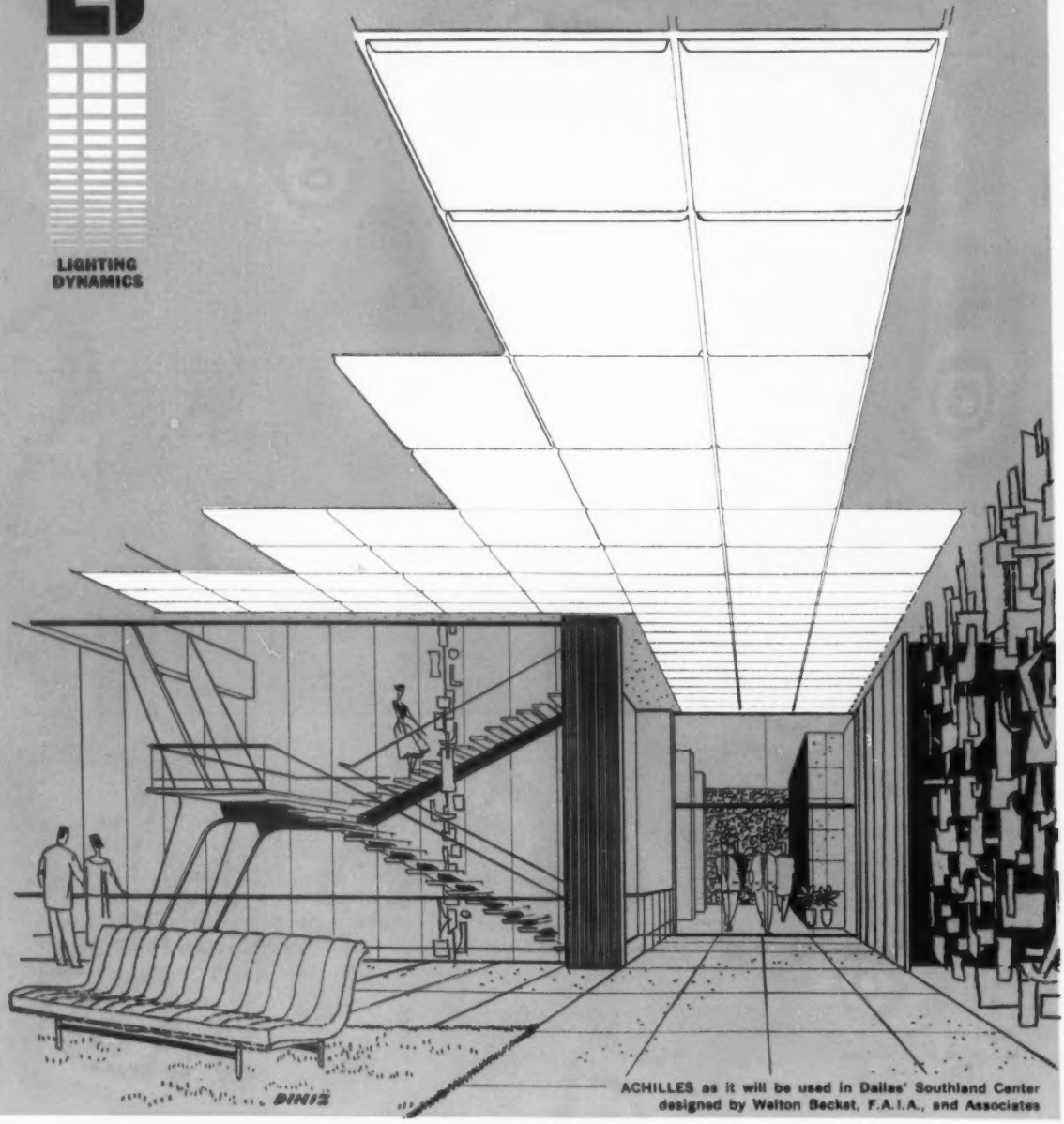
problem solution

An easily maintained, integrated fixture was needed for Welton Becket's dramatic "squares of light" ceiling in the lobbies and offices of Southland Life's spectacular 42-story Southland Center in Dallas.

ACHILLES by Lighting Dynamics was specified for the lobby... and it's companion Apollo was used in the offices throughout the center. Achilles is a highly versatile fixture series ideal for this demountable acoustical ceiling—just as it is for countless other ceiling suspension systems. It's quickly installed with a drop-in installation and has easy maintenance with press-to-open catches and hook-on hinges. Durable, Bonderized and electro-static, high-reflectance finishes... FOR MORE COMPLETE INFORMATION, call your Lighting Dynamics representative, or write to Lighting Dynamics, 802 West Whittier Blvd., Whittier, California or Lighting Dynamics, 8700 Ambassador Row, Dallas, Texas.

LIGHTING DYNAMICS



ACHILLES as it will be used in Dallas' Southland Center designed by Welton Becket, F.A.I.A., and Associates

Narda SonBlasters offer the most complete line of lowest-cost mass-produced ultrasonic cleaners!

Narda's mass-production techniques assure you the most complete line of ultrasonic cleaners at the lowest prices in the industry! From the smallest 35-watt to the amazing 2500-watt unit with a tank capacity of 75 gallons, Narda's SonBlasters are available now—off-the-shelf—for immediate delivery. And with a full 2-year warranty besides!

What do you want to clean? Electric meters, gas meters (new and used), dial faces, insulators, lighting fixtures (reflectors and covers), instantaneous removal of all contaminants from magnetic computer tapes, instruments, timing mechanisms—Narda's SonBlasters clean 'most any mechanical, electrical or horological part or assembly you can think of—and clean faster, better and cheaper.

No matter what you need in ultrasonic cleaning equipment, you'll find Narda's complete line of production-size units have the quality, power, performance, capacity and appearance of cleaners selling up to three times their price! Write for more details now and we'll include a free questionnaire to help determine the precise model you need.

Generator G-202 **Transducerized Tank NT-202**
35 watts **Capacity: ⅜ gallon**

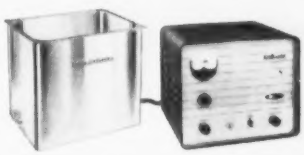
An amazingly efficient, yet inexpensive, ultrasonic cleaner. Duty cycle timer permits operator to turn the unit on, set it, and leave; the SonBlaster will turn off automatically at the end of the cycle. Four choices of timers—from 0-15 min. to 0-120 min. Also available without timer at slightly lower cost (G-201).

$220

Generator G-601 **Transducerized Tank NT-602**
60 watts **Capacity: 1 gallon**

A more powerful production-type unit, with a special circuit and selector switch permitting operator to alternate between two tanks, when items being cleaned require different solutions or a two-step process.

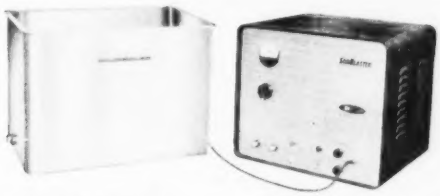
$350



Transducerized Tank NT-1505 **Generator G-1501**
Capacity: 5 gallons **200 watts**

The lowest price in the industry for a tank of this capacity and activity. Generator also will operate 2, 3 or 4 submersible transducers at one time, with just a turn of the load selector switch on the front panel.

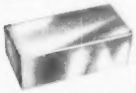
$695



Transducerized Tank NT-5001 **Generator G-5001**
Capacity: 10 gallons **500 watts**

Generator features standby switch for longer life and load selector switch on the front panel to operate up to 8 submersible transducers or 8 NT-602 or 2 NT-1505 transducerized tanks at one time. Larger tanks available on special order.

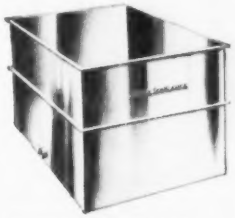
$1325



Submersible Transducer NT-605

Heli arc welded stainless case, hermetically sealed for safe, leak-proof immersion. Radiating face: 27 sq. in. Effective plane of radiation: 40-50 sq. in. (approximately 10" x 5"). Effective cavitation of volumes up to 1200 cu. in. at 24 in. tank height (5 gal.) and 2400 cu. in. at 48 in. tank height (10 gal.). Bulkhead electrical fitting on back allows all wiring connections to be made on outside of tank. For use in any arrangement or location in any shape tank you desire to use. Also available—model NT-604, identical with NT-605, except for pipe thread instead of bulkhead fitting, permitting electrical connections inside of tank.

$130

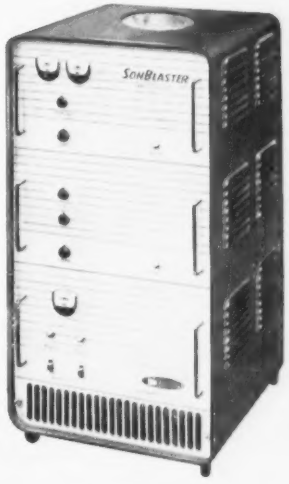


Transducerized Tank
NT-25001
Capacity: 75 gallons

Powerful unit drives the largest mass-produced industrial-size transducerized ultrasonic cleaning tank made! Also energizes up to 40 Narda 60-watt submersible transducers (NT-604 or -605). Capable of energizing tanks measuring up to 150 square feet of area by 2' or 3' high.

$4360

Generator G-25001
2500 watts



Consult with Narda for all your ultrasonic requirements. The SonBlaster catalog line of ultrasonic cleaning equipment ranges from 35 watts to 2.5 KW, and includes transducerized tanks as well as immersible transducers which can be adapted to any size or shape tank you may now be using. If ultrasonics can be applied to help improve your process, Narda will recommend the finest, most dependable equipment available—and at the lowest price in the industry!

For further information, or a demonstration by our representative in your area, write or call Dept. EW

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WESTERN REGIONAL OFFICES
3259 Wilshire Blvd., Los Angeles 5, Calif.
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EUGENE FIORAMONTI, Manager

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KEEPING PACE WITH THE NEEDS OF UTILITIES

HILL TRANSFORMER CO's recent modernization of all its manufacturing facilities has provided a reliable source of recognized quality-made power and distribution transformers. This is just one more step in HILL's long-range program to better serve the rapidly expanding electric utility industry through a wholly Western-owned transformer manufacturing company.

An extensive, continuing research and development program is a vital part of HILL's present operation —making certain future demands for trouble-free transformers will be actively met.

HILL TRANSFORMER CO., INC.
1030 WASHINGTON STREET SAN CARLOS, CALIFORNIA

HILL

Sales representatives in Seattle, Portland, San Francisco, Los Angeles, Salt Lake City, Denver, Albuquerque, Dallas, Houston and Honolulu.